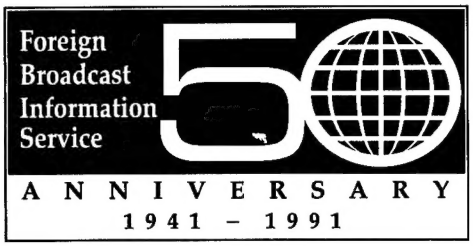
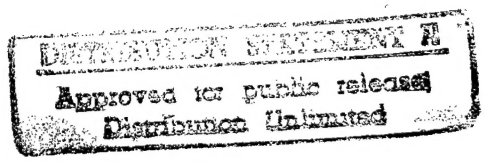
JPRS-UEE-91-006
26 JULY 1991



JPRS Report



Science & Technology

USSR: Electronics & Electrical Engineering

DTIC QUALITY INSPECTED 2

19980120 133

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA 22161

Science & Technology
USSR: Electronics & Electrical Engineering

JPRS-UEE-91-006 *26 July 1991*

CONTENTS

Broadcasting, Consumer Electronics

Effect of Operating Conditions on the Service Life of High-Pressure Sodium-Discharge Lamps
[S. V. Alyshev, V. V. Merkushkin; SVETOTEKHNIKA, No 2, Feb 91] 1
The Demercurization of Mercury-Vapor Lamps *[V. K. Mikhaylov; SVETOTEKHNIKA, No 2, Feb 91]* . 1
Ultrahigh-Pressure Xenon Discharge Lamps *[S. A. Klyuev; SVETOTEKHNIKA, No 2, Feb 91]* 1
The Difficult Days of Conversion *[Ye. Turubara; RADIO, No 2, Feb 91]* 1
Personal Radio Communications: A Radio for Every Day *[B. Stepanov; RADIO, No 2, Feb 91]* 1
Pulse-Width Coding Tester *[V. Shabaev; RADIO, No 2, Feb 91]* 1
A Personal Modular Reception Installation *[S. Sotnikov; RADIO, No 2, Feb 91]* 2
The Authors of Viruses and Their Victims *[A. Gutnikov; RADIO, No 2, Feb 91]* 2
"Orion-128": We Report the Details. *[V. Sugonyako, V. Safronov; RADIO, No 2, Feb 91]* 2
The "Meridian RP-348" All-Wave Radio Receiver *[T. Barchukova; RADIO, No 2, Feb 91]* 2
Application of the KR1533 Series Integrated Circuit *[S. Alekseev; RADIO, No 2, Feb 91]* 2
The First Steps Toward the Development of a Screen Technology
[Ye. Yermakova; TEKHNIKA KINO I TELEVIDENIYA, No 1, Jan 91] 2
Floppy Disks *[Yu. A. Vasilevskiy; TEKHNIKA KINO I TELEVIDENIYA, No 1, Jan 91]* 3
Picture Noise Suppression Algorithm
[S. A. Yelmanov; TEKHNIKA KINO I TELEVIDENIYA, No 1, Jan 91] 3
Methods of Enhancing Color Picture Quality in Compact Color Television Cameras
[A. G. Vaniev; TEKHNIKA KINO I TELEVIDENIYA, No 1, Jan 91] 3
Measuring Television Signal Distortion
[V. V. Babich; TEKHNIKA KINO I TELEVIDENIYA, No 1, Jan 91] 3
Cable Television in Georgia in Operation
[G. M. Gabeskiriya; TEKHNIKA KINO I TELEVIDENIYA, No 1, Jan 91] 3
Cost Determination of New Technology Products Obtained by Experimental Manufacturing
[G. I. Troshin; TEKHNIKA KINO I TELEVIDENIYA, No 1, Jan 91] 3

Circuits, Systems

Investigation of Vegetation Cover's Effect on Backscattered Millimeter Band Field
[A. A. Potapov; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 4
Analysis of Satellite Radiometer Antenna Radiation Pattern by Aircraft Model Measurement Data
[V. P. Yakovlev; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 4
Vector Problem of Diffraction on Lattice in Multilayer Magnetodielectric With Screen
[A. I. Adonina, A. I. Slyusarev; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 4
Using E-Pulse for Sounding of Solids Under Surface of Medium
[D. O. Batrakov, A. B. Vasilyev, et al.; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 4
Invariant Noncoherent Detection of Random Signal Through Gaussian Noise With Unknown Transient Characteristics *[G. M. Bashin; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91]* 5
Timing of Signals With Pseudorandom Operating Frequency Retuning
[V. I. Prytkov, A. V. Varlamov, et al.; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 5
Maximum Efficiency Interference in Binary Data Transmission System
[B. A. Khadzhi; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 5
Spontaneous and Stimulated Emission by Electrons Interacting With Whispering Gallery Mode
[L. A. Vaynshteyn, A. I. Kleyev, et al.; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 5
On Parametric E-M Wave Demodulation by Ultrasound on Water/Air Interface
[G. N. Romanova, G. Ya. Shaydurov; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 2, Feb 91] 6
Random Antenna Array Field in Fresnel Zone
[Ya. S. Shifrin, V. A. Nazarenko; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 1, Jan 91] 6
Digital Realization of Quadrature Signal Components
[V. I. Serebrennikov, A. S. Ponomarev, et al.; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 1, Jan 91] 6

Optimal Space-Time Phase-Modulated Signal Reception in Presence of Phase Distortions
[V. A. Potapov, A. B. Shmelev; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 1, Jan 91] 6
On First Soviet Investigations of Superwideband Radar
[Ya. D. Shirman, V. B. Almazov, et al.; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 1, Jan 91] .. 7
Energy Patterns of Electromagnetic Wave Transformation on Ionization Front Accompanied by Electron Current
[M. I. Bakunov, V. N. Parshin; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 1, Jan 91] 7
Dispersion Characteristics of Relativistic Microwave Cherenkov Device
[D. B. Luzyanin, V. M. Pikunov; RADIOTEKHNIKA I ELEKTRONIKA, Vol 36 No 1, Jan 91] 7

Transportation

Contactless Microprocessor Interfaces of Railroad Automation Systems With Outdoor Entities
[O. K. Dreyman, D. V. Gavzov, et al.; AVTOMATIKA, TELEMEKHANIKA I SVYAZ, No 1, Jan 91] ... 8
Radio Communication in Linked Trains
[Yu. V. Vavanov, A. I. Yashin; AVTOMATIKA, TELEMEKHANIKA I SVYAZ, No 1, Jan 91] 8
Using Electronic Concentrators in Telegraph Network
[I. P. Barbash, I. A. Zdorovtsov, et al.; AVTOMATIKA, TELEMEKHANIKA I SVYAZ, No 1, Jan 91] .. 8
Bidirectional Highly Stable Wide-Band Amplifier
[Ye. Ye. Golikov; AVTOMATIKA, TELEMEKHANIKA I SVYAZ, No 1, Jan 91] 9
All-Purpose Meter of ALSN Code Time Parameters
[V. I. Parashchenko; AVTOMATIKA, TELEMEKHANIKA I SVYAZ, No 1, Jan 91] 9

Instrumentation, Measurements

Method of Determining Dynamic Response in Using Real Test Signal
[I. V. Boykov; IZMERITELNAYA TEKHNIKA, No 1, Jan 91] 10
Analysis of Integrated Information System Pickups
[L. E. Shvartsburg; IZMERITELNAYA TEKHNIKA, No 1, Jan 91] 10
Pulsed Electromagnetic Field Transducer Analysis
[S. A. Podosenov, A. A. Sokolov; IZMERITELNAYA TEKHNIKA, No 1, Jan 91] 10
Increasing Noise Immunity and Accuracy of Self-Circulating Ultrasound Velocimeters
[M. Ye. Unksov, B. Ya. Shpichenetskiy; IZMERITELNAYA TEKHNIKA, No 1, Jan 91] 10
On Decreasing Energy Dependence of Silicon Detector Sensitivity
[B. A. Nikitin, V. M. Budnitskiy, et al.; IZMERITELNAYA TEKHNIKA, No 1, Jan 91] 11
Automated Sound Level Meter Testing Workstation
[M. Z. Geykhman, V. P. Sosnovskaya, et al.; IZMERITELNAYA TEKHNIKA, No 1, Jan 91] 11

Aerospace, Electronic Systems

Radar Glint Noise: Survey
[P. A. Bakulev, G. G. Dzhavadov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 12
Integral Approximation Method Application in Problem of Optimal DPSK Signal Detection
[Yu. N. Kirillenko; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 12
Quasioptimal Discrete Signal Demodulation Against Background of Additive and Multiplicative Non-Gaussian Noise
[O. I. Shelukhin, A. F. Fomin, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 12
Cross-Correlation Function of RF Thermal Surface Signal During Space Diversity Reception
[S. Ya. Kolmakov, L. F. Chukin; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 12
Determining Number of Noise Radiation Sources During Their Parallel Direction Finding
[V. N. Manzhos, M. L. Rudnev; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 13
Experimental Investigation of Entropy Minimax Method
[V. V. Savchenko, D. Yu. Akatyev, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 13
Optimization of RF Instruments for Airborne Laser Velocimeters
[A. A. Sosnovskiy, S. N. Khaykin; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 13

Fading Model of VHF-UHF Mobile Radio Communication Channel Operating Over Moderate Terrain
[A. Ye. Rynkov, V. Ye. Fedyayev; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 13
Binary Signal Parameter Discrimination During Digital Processing
[A. I. Velichkin, V. Yu. Yakovlev; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] Vol 34 No 1, Jan 91] 14
Asymptotic Bahadur Efficiency of Certain Detection Tests in Spectral Space
[G. S. Fedorov, R. P. Filimonov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 14
Effect of Truncation on Measure of Efficiency of Certain Invariant Detection Criteria
[G. S. Fedorov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 14
Analysis of Hierarchical Algorithms of Image Overlap Against Background of Spatial Local Noise
[V. A. Gorokhovatskiy, V. V. Shlyakhov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 15
Synthesis of Optimal Transmitter of Single-Sideband Companded Signals
[A. A. Volkov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 15
Features of Optical Band Receiver Sensitivity Estimation
[N. F. Vollerner; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA, Vol 34 No 1, Jan 91] 15

Industrial Electronics, Control Instrumentation

Electromagnetic Processes in Linear Induction Motors Allowing for Secondary Body Conductivity Changes by Length
[P. A. Vishtak, I. P. Kondratenko, et al.; TEKHNICHESKAYA ELEKTRODINAMIKA, No 1, Jan 91] .. 16
New Approach to Analyzing Observability and Checking Telemetry for Estimating Electric Power System Condition *[Z. B. Kremens; TEKHNICHESKAYA ELEKTRODINAMIKA, No 1, Jan 91]* 16
Detecting Moving Ferromagnetic Objects Behind Plane Screen by Induction Method
[A. P. Popov, M. R. Vinokurov; TEKHNICHESKAYA ELEKTRODINAMIKA, No 1, Jan 91] 16

Computers

Interaction Model of Parallel Asynchronous Discrete Processes
[A. Yu. Klug, S. A. Yuditskiy; AVTOMATIKA I TELEMEKHANIKA, No 3, Mar 91] 17
Synthesizing Self-Checking Compact Diagnostic Systems
[I. P. Litikov; AVTOMATIKA I TELEMEKHANIKA, No 3, Mar 91] 17
Digital-to-Analog Converter Error Checking and Correction Allowing for Digit Interaction
[R. M. Grushvitskiy, B. A. Manchev, et al.; AVTOMATIKA I TELEMEKHANIKA, No 3, Mar 91] 17

Communications

On Efficacy of Suspending Telephone Cables From 0.4 kV Power Transmission Line Supports
[V. F. Kalyuzhnyy, I. D. Shneyder; VESTNIK SVYAZI, No 2, Feb 91] 18
DR DOS: Increased Security *[Yu. Yu. Vasilenko; VESTNIK SVYAZI, No 2, Feb 91]* 18
Standard Replacement Module Diagnostic and Repair Workstation for 'Kvant' Quasielectronic Exchange *[A. I. Chernyshev; VESTNIK SVYAZI, No 2, Feb 91]* 18
Capacity of Digital Radio Relay Communication Links Will Increase
[V. M. Minkin, L. M. Grozovskiy, et al.; VESTNIK SVYAZI, No 2, Feb 91] 18
'Istok' Operation Center *[V. Ya. Naumov, V. F. Plotko, et al.; VESTNIK SVYAZI, No 2, Feb 91]* 19

Power Engineering

Inductive Energy Storage and Certain Issues of Increasing Power System Reliability
[Yu. S. Petrusha; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 2, Feb 91] 20
Lightning Surges in Generator Voltage Networks and Protection Against Them
[Zh. V. Yefremova, K. P. Kadomskaya; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 2, Feb 91] 20

Temperature Condition in Plasma Sheet Electrode's Dielectric Substrate of TEA CO_2 Laser
[O. A. Zhuravlev, M. P. Shlykova, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 2, Feb 91] 20
On Status and Development Outlook of Power Industry Development and Social Safety Net for Industry Workers Under Market Economy Conditions
[Yu. K. Semenov; ENERGETICHESKOYE STROITELSTVO, No 2, Feb 91] 20
Technical Problems of Building Underground Power Plant Units
[V. A. Rumyantsev; ENERGETICHESKOYE STROITELSTVO, No 2, Feb 91] 21
Environmentally Clean Boiler Plant
[S. M. Shestakov, O. V. Nikitina, et al.; ENERGETICHESKOYE STROITELSTVO, No 2, Feb 91] 21
Expanding Direct Current Transmission Applications
[D. L. Faybisovich; ENERGETICHESKOYE STROITELSTVO, No 2, Feb 91] 21
On Use of Dry Mortar Mixtures in Construction by Foreign Companies
[S. V. Movchan; ENERGETICHESKOYE STROITELSTVO, No 2, Feb 91] 21
Tests of Asynchronized Electromechanical Frequency Converter on Electrodynamic Model
[I. Yu. Miroshnikov, V. V. Sarkisyan, et al.; ELEKTRICHESTVO, No 2, Feb 91] 22
Motion of Charged Fibers in Nonuniform Electric Field
[P. G. Shlyakhtenko, G. P. Meshcheryakova; ELEKTRICHESTVO, No 2, Feb 91] 22
Electromagnetic Pulse Field Propagation in Conducting Medium
[A. N. Gorskiy; ELEKTRICHESTVO, No 2, Feb 91] 22

Electrical Insulation

Polyimide-Containing Composite Materials for Electrical Equipment Insulation
[L. P. Tkacheva, V. V. Rozhkov, et al.; ELEKTROTEKHNIKA, No 1, Jan 91] 23
New Silicone Finish Enamel
[T. P. Ukhartseva, V. V. Rozhkov, et al.; ELEKTROTEKHNIKA, No 1, Jan 91] 23
Mica-Containing Insulation for Magnet Wire
[N. S. Oknin, V. A. Khval'kovskiy, et al.; ELEKTROTEKHNIKA, No 1, Jan 91] 23
Ohmic Contacts for Power Semiconductor Devices Based on New Adhesive Composites
[S. A. Shaboyan, R. P. Meliksetyan; ELEKTROTEKHNIKA, No 1, Jan 91] 23
Automated Product Engineering Level Assessment System
[V. M. Fomin, G. B. Onishchenko, et al.; ELEKTROTEKHNIKA, No 1, Jan 91] 23
Certain Strain and Deformation Mechanisms of Cables Fabricated From Inorganic Materials
[Yu. V. Rybakov; ELEKTROTEKHNIKA, No 1, Jan 91] 24

Quantum Electronics, Electro-Optics

Acoustic-Optical Devices
[Ioffe Physicotechnical Institute; AKUSTOOPTICHESKIYE USTROYSTVA (SBORNIK NAUCHNYKH TRUDOV) 1989] 25

Effect of Operating Conditions on the Service Life of High-Pressure Sodium-Discharge Lamps

917K0249A Moscow SVETOTEKHNIKA in Russian No 2, Feb 91 pp 1-4

[Article by S. V. Alyshev, V. V. Merkushkin, L. Ye. Petrovskiy]

[Abstract] The effect of operating conditions as well as manufacturing and transportation defects on the service life and performance of imported high-pressure sodium-discharge lamps is investigated. Lamps manufactured by General Electric, Westinghouse, Sylvania, Phillips, Mazda, Ivasaki, Toshiba and several other companies are considered. Analysis reveals that the primary causes of lamp failure during operation are burner defects resulting from poor sealing of the metal-ceramic components, nibium exhaust stems and the lack of sealing tests. A table listing the causes of the most common lamp failures is provided. High-pressure sodium discharge lamps are also found to be highly sensitive to operating conditions, particularly voltage fluctuations, environmental temperatures and vibrations. This study recommends including in specifications the dependence of reliable service life of such lamps on voltage fluctuations and ambient temperature.

The Demercurization of Mercury-Vapor Lamps

917K0249B Moscow SVETOTEKHNIKA in Russian No 2, Feb 91 pp 4-6

[Article by V. K. Mikhaylov]

[Abstract] The environmental danger posed from discarded mercury-vapor lamps is discussed. The problems of mercury contamination of soil and water tables in Japan and other western nations are briefly examined. The use of demercurization of such lamps as a means of eliminating contamination threats is discussed, and the costs and procedures of processes employed in both the Soviet Union and abroad are reviewed. The study recommends several specific and immediate organizational and engineering measures to counteract contamination threats, including the commercial use of titanium mercuride or other mercury compounds at lower concentrations in mercury-vapor lamps and the establishment of recycling centers for such lamps.

Ultrahigh-Pressure Xenon Discharge Lamps

917K0249C Moscow SVETOTEKHNIKA in Russian No 2, Feb 91 pp 22-23

[Article by S. A. Klyuev]

[Abstract] The original ultrahigh-pressure xenon discharge lamp designs developed at the Riga electric lamp factory are reviewed. These lamps employ a unique air-cooled lamp design with certain models using mechanically-packed current conductors and others employing cyclindrical or ribbon-type foil conductors. A table listing the lamp designs as well as their specifications (length, bulb diameter, arc length, maximum voltage, minimum current, luminance, luminous flux) is provided. Casings fabricated from quartz glass as well as doped or coated titanium silicate glass are also compared.

The Difficult Days of Conversion

917K0248A Moscow RADIO in Russian No 2, Feb 91 pp 2-4

[Article by Ye. Turubara]

[Abstract] A brief interview with Aleksandr Anatol'evich Ivanov, Deputy Minister of the USSR Ministry of Communications, relating to the current efforts to convert military-oriented manufacturing enterprises to the production of domestic electronics products is presented. Increases in domestic sector output of televisions (14 percent), magnetic tape recorders and radio recorders (29 percent) and radio receivers (23 percent) are cited. The manufacture of new products for the populace by such enterprises is also noted (a former tank-radio manufacturing enterprise now producing portable radios with improved reception is cited as an example). The opportunities for joint ventures with Siemens, Italtel, Samsung and other western companies are briefly discussed with special attention devoted to the interest such companies have demonstrated in the technology and know-how at formerly military-oriented enterprises.

Personal Radio Communications: A Radio for Every Day

917K0248B Moscow RADIO in Russian No 2, Feb 91 pp 19-20

[Article by B. Stepanov]

[Abstract] The Delta-02 radio set manufactured by Stabo, Germany, for AM-based radio communications in the citizens band range is reviewed. The Delta-02, a portable AM transceiver operating between 27.005 and 27.135 MHz and producing a transmitter output power of 0.5 W, is based on a single TBA820 IC and a single TCA440 IC. The receiver section has a sensitivity of 1 microvolt at a signal-to-noise ratio of 10 dB. The general circuit design and layout of this tranceiver are examined and a schematic is provided.

Pulse-Width Coding Tester

917K0248C Moscow RADIO in Russian No 2, Feb 91 pp 30-32

[Article by V. Shabaev]

[Abstract] A pulse-width coding tester for application to cable testing and repair is described. The tester, which employs a K564 series CMOS integrated circuit as well as pulse-width coding to substantially reduce capacitive noise from pulse sources, is examined from the viewpoint of utility compared to previous testers employing a serial digital code. The new tester is found to exhibit superior

noise immunity. The timing pulses produced by the tester are provided together with schematics and pin layouts of the integrated circuits.

A Personal Modular Reception Installation

917K0248D Moscow RADIO in Russian No 2, Feb 91 pp 33-35

[Article by S. Sotnikov]

[Abstract] Parabolic reflector antennas for application to a personal modular reception installation for satellite television reception are reviewed. The basic design principles of long- and medium-focus reflectors in Cassegrain-type two-reflector antennas are briefly discussed. The dimensions and layout of the main reflector and the subreflector in such designs as well as the mathematical relations employed to determine such dimensions are reported. Design considerations relating to the size and placement of antenna components (subreflector, feed, waveguide, etc.) are examined. The principal antenna design discussed in this article is employed in the two centimeter wavelength band.

The Authors of Viruses and Their Victims

917K0248E Moscow RADIO in Russian No 2, Feb 91 pp 41-43

[Article by A. Gutnikov]

[Abstract] A brief review of presently-known or identified computer viruses is given. This article is a continuation of a previous article by the author devoted to an antivirus program that blocks a virus' access to the operating system. The article reports that as of July 1990, there were 32 viruses in Moscow with 23 believed to originate from abroad. A table of known viruses listing the virus length in bytes, files infected, varieties known and most common name (e.g. Dark Avenger, Friday the 13th, Virus- 101) is provided. Methods of combating computer viruses are discussed and some of the more popular programs are listed (ADM, WatchDog, MAVR and PROTEK).

"Orion-128": We Report the Details.

917K0248F Moscow RADIO in Russian No 2, Feb 91 pp 44-48

[Article by V. Sugonyako, V. Safronov]

[Abstract] The Elektronika MS7007 computer keyboard modification is reported. This keyboard, which employs film technology with deposited contacts (when a key is pressed, the film is compressed and the contacts close), is a modification of the MONITOR-2 system. The steps in this modification, which include rewiring of the printed circuit board and development of a new program driver, are listed. The new pin layout and wiring diagram for connecting the DD53 IC to the X4 connector are given. Interface circuits and other elements needed to support the modification are also provided. Test results are reported.

The "Meridian RP-348" All-Wave Radio Receiver

917K0248G Moscow RADIO in Russian No 2, Feb 91 pp 52-55

[Article by T. Barchukova]

[Abstract] The Meridian RP-348 AM all-wave radio receiver is discussed. The operating bands of the receiver (148-285 kHz; 525- 1607 kHz; 9.5-9.8 MHz and 11.7-12.1 MHz) are listed together with the general specifications (sensitivity at a signal-to-noise ratio of 20 dB in the long-, medium- and short-range bands of 2.0, 1.2 and 0.5 microvolts per meter, respectively; single signal neighboring channel selectivity: better than 26 dB; frequency ranges: AM: 315-3150 and FM 315-6300). The circuit design and layout of this receiver are given (three IC's; all solid state design) together with a schematic diagram.

Application of the KR1533 Series Integrated Circuit

917K0248H Moscow RADIO in Russian No 2, Feb 91 pp 64-65

[Article by S. Alekseev]

[Abstract] A list of the integrated circuits in the KR1533 IC series is given, and their design features, operating principles and applications are discussed. This integrated circuit series, which employs a design consisting of two four-bit storage registers with inputs C, R and Z, is examined in its specific circuit realizations (over 25 circuit designations in the series). Applications (multiplexers, switches, gates) are reported and examined together with nominal voltages, switching levels and wiring configurations. Schematic designations for the various circuits in this series are provided.

The First Steps Toward the Development of a Screen Technology

917K0262A Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 1, Jan 91 pp 5-9

[Article by Ye. Yermakova]

UDC 791.43

[Abstract] An interview with Kirill Emil'evich Razlogov, Director of the Scientific-Research Institute of Culture and newly appointed Chairman of the Soviet of Screen Culture, covers the development of what is termed "screen technology" in the Soviet Union. This concept covers not only movie technology and engineering, but also research into the social and societal aspects of cinematography and moviemaking. The relative role of film and movies in Soviet culture is discussed together with the changing official attitude towards film as a medium.

Floppy Disks

917K0262B Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 1, Jan 91 pp 17-18.

[Article by Yu. A. Vasilevskiy]

[Abstract] The design, principles of operation and applications of floppy disks in personal computers are reviewed. Special attention is devoted to data writing techniques on floppy disks, the principles of magnetic recording and playback, the use of pulsed signals, digital signal waveforms, common hardware configurations and typical signal codes and modulation methods. This is a basic survey article focusing strictly on general principles and mechanisms without considering specific equipment or configurations.

Picture Noise Suppression Algorithm

917K0262C Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 1, Jan 91 pp 33-35

[Article by S. A. Yelmanov]

UDC 621.397.822.621.397.13

[Abstract] A noise suppression algorithm for application to suppression of picture noise in television broadcasting is proposed. The algorithm is a spatial filtering algorithm that implements adaptive, running signal averaging from a two-dimensional aperture whose shape is determined by the picture in a square region of the pixel. The algorithm is tested on a special TV picture analysis system that processes intelligence obtained under severe reception conditions. The algorithm is found to effectively suppress noise in images containing low-contrast, fine objects of complex shape.

Methods of Enhancing Color Picture Quality in Compact Color Television Cameras

917K0262D Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 1, Jan 91 pp 35-37

[Article by A. G. Vaniev]

[Abstract] Various methods of improving the picture quality in compact color television cameras are reviewed. Diffraction and phase gratings as well as birefringent optical elements for partial picture defocusing are discussed as well as low-pass optical filters. Beat suppression methods that employ cylindrical lenses that implement horizonal defocusing are also examined. Other methods based on complex electromechanical devices are cited, but destabilizing factors limit their application. The optimum method in use today is a sampling moire suppression method that employs transparent birefringent 3-5 mm optical elements tuned to a specific suppression frequency. New methods of sampling moire suppression are reviewed, including techniques that employ the statistical properties of signal and interference; specifically, neighboring image field noise decorrelation.

Measuring Television Signal Distortion

917K0262E Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 1, Jan 91 pp 37-40

[Article by V. V. Babich]

UDC 621.391.832.621.397.13.08

[Abstract] An instrument used to monitor and test a variety of parameters of multiple television channels is reviewed. This instrument employs signal processing algorithms to represent measurement results in absolute, relative or difference form. This makes it possible to determine the fraction of distortion attributable to a specific section of a television circuit. A standard multiple test parameter measurement procedure followed by averaging is used to reduce random noise error. A block diagram of the instrument is given together with time-pulse diagrams of the output pulses.

Cable Television in Georgia in Operation

917K0262F Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 1, Jan 91 pp 51-53

[Article by G. M. Gabeskiriya]

UDC 621.397.743

[Abstract] A review of the history and conditions of cable television development and expansion in the Soviet Union is provided. The competing views regarding the provision of cable service in the cities and provinces are discussed, as well as associated problems concerning financing, authorization and operating costs. The planning and development of a cable television system by the staff of the State Committee on Television and Radio Broadcasting of the Georgian SSR and Tbilgorproekt is presented as a case study. It is claimed that this system, which has a 2,000 subscriber capacity, is to absorb 1800 subscribers by spring of 1990 and subsequently provide high-quality broadcasts of two union and two republic programs as well as an additional channel for retransmission of UHF FM radio broadcasts.

Cost Determination of New Technology Products Obtained by Experimental Manufacturing

917K0262G Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 1, Jan 91 pp 53-54

[Article by G. I. Troshin]

UDC 338.51+658.589.338.51

[Abstract] The degree to which quality factors affect the labor intensity of an experimental product design is determined. Specific standard levels of labor intensity corresponding to specific modifications in specifications achieved by development of design documentation and manufacturing of a prototype are determined. A formula is provided for calculating this standard. A procedure is then developed for employing this formula to determine the cost of prototypes of new technology that makes it possible to predict future costs as well as to adjust such costs accounting for changes in actual manufacturing conditions.

Investigation of Vegetation Cover's Effect on Backscattered Millimeter Band Field

917K0283A Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 239-246

[Article by A. A. Potapov]

UDC 621.371.029.65

[Abstract] Statistical characteristics of the millimeter wave (MMV) and backscattered field at a 135 GHz frequency determined in experiments on remote sensing of vegetation are presented. In so doing, the applicability range of semiemprical models is extended to a 2.2 mm wavelength (135 GHz) at incidence angles of 0-80°. Equipment with a 140 dB energy potential and a reflector antenna with a 0.6 m diameter and circularly polarized radiation were used. Measurements were taken by the relative method with calibration by standard corner and spherical reflectors placed at a distance of 150 m at a 2 m height. The relative effective scattering cross section (EPR) error did not exceed 10 percent when calibration standards were changed. The necessary incidence angle range was obtained by using a swiveling reflecting shield. Various types of soil and vegetation were examined in August. It is suggested that Johnson's parametric family be used to describe the EPR distribution law. References 22: 20 Russian, 2 Western; figures 6; tables 3.

Analysis of Satellite Radiometer Antenna Radiation Pattern by Aircraft Model Measurement Data

917K0283B Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 247-253

[Article by V. P. Yakovlev]

UDC 621.396.67.01

[Abstract] The problem of estimating the beamwidth, shape, and amplitude of a satellite microwave (SVCh) radiometer antenna without direct access to the radiometer platform is considered. To this end, data obtained by simultaneously measuring the same entity or testing range by satellite and airborne radiometers are used. The dependence of the surface radiance temperature on its spatial coordinate is analyzed. As a result, the following requirements are formulated for the testing range and the airborne radiometer system: if aircraft model data are used to analyze the satellite radiometer, airborne measurements are used within several satellite instrument fields of view without statistical averaging whereby the testing range size must exceed that of the satellite radiometer resolution element. When taking airborne measurements, the difference between sample moments and nominal moments must be much smaller than the airborne radiometer's resolution element. Moreover, when airborne and satellite data are statistically averaged, the testing range size must be much greater than than the satellite radiometer's resolution element so as to ensure the necessary sample volume for calculating the correlation function. References 4.

Vector Problem of Diffraction on Lattice in Multilayer Magnetodielectric With Screen

917K0283C Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 267-274

[Article by A. I. Adonina, A. I. Slyusarev]

UDC 537.874.6

[Abstract] Vector problems of diffraction are investigated from the viewpoint of developing the body of mathematics for solving complex boundary value electrodynamics problems or finding applications of these developments. Random incidence of a planar monochromatic wave upon a lattice consisting of infinitely thin, perfectly conducting metallic strips with given lattice and slot constants located in a multilayered isotropic magnetodielectric with or without a perfectly conducting screen under the structure is considered in an exact boundary value problem formulation. It is assumed without any loss of generality that electric parameters of the layers are known. The problem is solved by Riemann's - Gilbert's method using its generalization algorithm. Numerical analyses show that if the number of layers is increased and their thickness is decreased, then starting with a certain number any subsequent increase does not affect the field's integral characteristics. The resulting theoretical and analytical data may be used to design antennae, e.g., phased arrays or Cassegrainian antennas with a rotating polarization plane, as well as polarization and frequency filters, polarization converters, etc. They may also be used for investigating inhomogeneous media by simulating them by means of multilayer structures. References 8; figures 4.

Using E-Pulse for Sounding of Solids Under Surface of Medium

917K0283D Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 303-307

[Article by D. O. Batrakov, A. B. Vasilyev, L. V. Myakinkova, S. N. Shulga]

UDC 537.874.6.01

[Abstract] The task of identifying a radar target by using the spectrum of its natural frequencies is examined and the method of using the so-called *E*-pulse - a specially shaped nonmonochromatic signal whereby a random target is irradiated by this signal - is considered. The resulting echo signal contains the contribution of the scatterer's natural oscillations: if the target coincides with the one to which the pulse is "tuned", the above contribution is equalized, making it possible to use the *E*-pulse for target classification. An *E*-pulse calculation technique is proposed and the corresponding transient problem of a scatterer which is a dielectric immersed in a uniform dielectric half-space is solved. It is thus demonstrated that in principle, the *E*-pulse can be used to identify low-Q scatterers concealed under the medium surface. References 9: 3 Russian, 6 Western; figures 4; tables 1.

Invariant Noncoherent Detection of Random Signal Through Gaussian Noise With Unknown Transient Characteristics

917K0283E Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 315-319

[Article by G. M. Bashin]

UDC 621.391.01

[Abstract] The problem of invariant (relative to the observation scale) detection of random signals against the background of independent Gaussian noise with unknown transient characteristics during an extended noncoherent accumulation of signal and noise mixture envelope samples for multichannel detection-identification systems with a linear detector is considered. The problem of noncoherent Gaussian signal detection through Gaussian noise with an unknown intensity, given a long-term envelope accumulation after linear detection, is extended to a multiple-alternative (i.e., invariant) case where independent samples received over an equal number of channels are formed by values of a discrete (in time) random process normalized due to an extended noncoherent accumulation of Rayleigh components with independent values inside the samples. The most powerful congruent optimal (relative to the likelihood ratio (OP) criterion) decision rules (DP) are derived and their efficiency is estimated. It is shown that in the case of known signal parameters for unsteady and steady noise, the invariant decision rule optimal in relation to OP coincides with the most powerful (NM) congruent decision rule. References 11.

Timing of Signals With Pseudorandom Operating Frequency Retuning

917K0283F Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 332-338

[Article by V. I. Prytkov, A. V. Varlamov, G. I. Tuzov]

UDC 621.391.01

[Abstract] Recent applications of signals with pseudorandom operating frequency retuning (PPRCh) in communications and control systems are addressed and specific cases where nonmodulated signals must be synchronized are examined. A receiver is synthesized, making it possible to obtain a rather efficient timing system design and determine the potential sync parameter accuracy in an explicit form. The resulting data are used as the basis for analyzing a more complex case of synchronizing a PPRCh signal modulated by an intelligence signal. Expressions for optimal (by the minimum estimate error variance criterion) sync parameters of PPRCh signals are derived in a Gaussian approximation and a block-diagram of the signal frequency and delay timing system is developed. The system is characterized by a single-channel delay discriminator which makes it possible substantially to simplify the frequency synthesizer (SCh) design. Approximations of the derivative of the likelihood functional with respect to the sync parameters made it possible to derive analytical expressions for the gain of tracking AFC (ChAP) filters and delay tracking systems (SSZ) and produce a strict estimate of the synchronization accuracy. References 3; figures 3.

Maximum Efficiency Interference in Binary Data Transmission System

917K0283G Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 364-369

[Article by B. A. Khadzhi]

UDC 621.391.01

[Abstract] A general binary communication system under the effect of interference with a correlation receiver optimal for white Gaussian noise is considered. An interference signal leading to most errors is synthesized in a class of random signals which depend on the shape of intelligence signals. The virtually inevitable mistiming of interference and intelligence signals is taken into account; in so doing, deterministic interference signals are not taken into consideration since their effect may, in principle, be equalized by adding a certain shift on the correlator output. The resulting interference's efficiency is compared to that of a Gaussian noise of the same intensity. It is shown that if the effective mean interference/legitimate signal power ratio is greater than unity, the optimal effective relative pulse duration is also equal to unity. It is also shown that if the above ratio is equal to 1/2, an interference signal with a random phase has an efficiency virtually equivalent to that of white Gaussian noise. References 2: 1 Russian, 1 Western; figures 2.

Spontaneous and Stimulated Emission by Electrons Interacting With Whispering Gallery Mode

917K0283H Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 377-386

[Article by L. A. Vaynshteyn, A. I. Kleyev, V. A. Solntsev]

UDC 621.385.6.01

[Abstract] Spontaneous and stimulated emission by electrons is defined. Emission by relativistic electrons moving in circular orbits in an open cavity whose natural oscillations represent a whispering gallery mode is considered. The outlook for using the corresponding interaction mechanism in relativistic electronics is discussed. It is shown that the interaction of electrons moving in a circular orbit with a whispering gallery mode has a number of valuable properties and can be experimentally realized with relative ease. In so doing, however, it is necessary to take into account problems related to the electron beam's energy spread and finite dimensions. Studies show that in our case the requirements imposed on the beam quality are more stringent than in free electron lasers (LSE) yet some electron current focusing difficulties may arise. The electron current's transverse dimensions may not substantially exceed the field's radial dimensions, i.e., must be no more than several tens of stimulated emission wavelengths.

Thus, Kapitsa's cavity design may be more promising from this viewpoint. References 11: 6 Russian; 5 Western; figures 4.

On Parametric E-M Wave Demodulation by Ultrasound on Water/Air Interface

917K0283I Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 2, Feb 91 pp 410-412

[Article by G. N. Romanova, G. Ya. Shaydurov]

UDC 621.376.2

[Abstract] The effect of parametric demodulation of electromagnetic waves reflected by the water surface irradiated by an underwater acoustic radiation source whereby small increments in the water's electromagnetic parameters, e.g., electric conductivity and relative dielectric permittivity, depend on the acoustic radiation intensity measured in V/m^2 is estimated quantitatively. An amplitude-modulated electromagnetic wave propagating along the water/air interface is considered. It is shown that at a signal frequency of 10^5 Hz at depths above 25 m, the demodulated components greatly exceed high-frequency components of the refracted field; as the signal frequency rises, the excess is observed at smaller depths. The above analysis suggests that the effect of electromagnetic wave demodulation by ultrasound on the interface of media with various physical properties may be used in some signal transmission and processing applications. References 1; figures 1.

Random Antenna Array Field in Fresnel Zone

917K0254A Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 1, Jan 91 pp 52-62

[Article by Ya. S. Shifrin, V. A. Nazarenko]

UDC 621.396.67.01

[Abstract] Mean and fluctuation field characteristics of random antenna arrays in the Fresnel zone are examined. To this end, expressions are derived for the mean field intensity and intensity fluctuations of a "random" antenna array in the Fresnel zone in the presence of random phase errors of radiator driving. The study was made for a type-3 linear random array. Type-3 array is defined as an intermediate case between an array with a given number of elements selected at random within the antenna length and an equidistant array some of whose elements are removed according to a random law. In so doing, possible array element excitation phase errors are taken into account. Plots illustrating the dependence of the above statistical characteristics on the array's sparsity degree, its dimensions, radiator excitation error variance, and observation point position are cited. The advantages of nonequidistant sparse arrays are considered. It is shown that such arrays make it possible to operate within a broader frequency band and swing the beam within a wider sector without the danger of diffraction lobes; they are also characterized by small interrelation of elements. References 12: 7 Russian, 5 Western; figures 7.

Digital Realization of Quadrature Signal Components

917K0254B Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 1, Jan 91 pp 70-74

[Article by V. I. Serebrennikov, A. S. Ponomarev, V. V. Sychev]

UDC 621.391.01

[Abstract] The possibility of digital realization of sampling values of quadrature components on the basis of the signal's sampling values obtained beforehand is considered. The spectrum of a complex signal with a limited band is represented by a Fourier series over a random frequency interval. The possibility of representing a narrow-band real-valued radio signal with the help of its real samples taken at a sampling rate which exceeds the signal frequency band by twofold is substantiated. The spectrum of the real-valued narrow-band signal consists of two complex-conjugate components in the domains of positive and negative frequencies expressed by means of the complex signal spectrum. The relationship between real signal samples and samples of its quadrature components is demonstrated. A digital signal component realization algorithm is synthesized. It is noted that this algorithm can be simplified whereby the initial signal phase will change by π, which is insignificant. References 2; figures 1.

Optimal Space-Time Phase-Modulated Signal Reception in Presence of Phase Distortions

917K0254C Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 1, Jan 91 pp 75-79

[Article by V. A. Potapov, A. B. Shmelev]

UDC 621.391.01

[Abstract] An efficient approach to solving the problem of nonlinear filtering of random processes based on the conditional Markov process theory developed by Stratonovich and subsequently extended to random fields is used to solve the problem of optimal space-time reception of phase-modulated (FM) signals subjected to phase distortions and observed against the background of Gaussian noise delta-correlated in space and time. The sources of spurious spatial phase fluctuations are considered. The design of an optimal receiver which makes it possible to extract legitimate information in a steady-state operation is synthesized in a Gaussian approximation and the quality of its performance is examined. A continuous aperture is used as an antenna model. References 6; figures 2.

On First Soviet Investigations of Superwideband Radar

917K0254D Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 1, Jan 91 pp 96-100

[Article by Ya. D. Shirman, V. B. Almazov, V. N. Golikov, V. I. Gomozov, A. P. Krivelev, D. A. Tsurskiy]

UDC 621.391.01 (47)

[Abstract] Work on full-scale and laboratory superwideband radar as well as efforts to develop and experimentally verify fast wideband spectral-time analysis conducted in the USSR on the basis of compression technology in the early 60's are reviewed. In particular, uses of frequency modulation of CW sounding oscillations, correlation-filtering processing of linear FM echo signals, methods of composite signal "shortening" on the basis of delay lines, ambiguity diagrams, secondary radiation of superwideband signals in a physical optics approximations, and other methods are considered. References 24: 21 Russian, 3 Western; figures 3.

Energy Patterns of Electromagnetic Wave Transformation on Ionization Front Accompanied by Electron Current

917K0254E Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 1, Jan 91 pp 118-123

[Article by M. I. Bakunov, V. N. Parshin]

UDC 537.874.4.01

[Abstract] Electromagnetic wave transformation on the plasma boundary of a more general mixed type—the ionization front accompanied by the electronic component flux of the resulting plasma—is investigated. It is shown that behind the ionization front electrons are entrained as a result of the wave breakdown in the discharge tube gas. Electromagnetic wave reflection from the moving ionization front is examined. It is shown that the entrainment of electrons behind the front even at velocities much slower than the front's velocity makes it possible considerably to increase the energy efficiency of the Doppler frequency incident wave transformation. The resulting data show that it is possible to use systems with an electron-entraining ionization front to develop microwave (SVCh) radiation frequency multipliers. Compared to relativistic electron beam systems, these devices are simpler since they do not call for using accelerators. It is also noted that the results may be used for developing Doppler breakdown wave diagnostic methods by means of microwave pulse probing. References 13: 11 Russian, 2 Western; figures 3.

Dispersion Characteristics of Relativistic Microwave Cherenkov Device

917K0254F Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 1, Jan 91 pp 141-156

[Article by D. B. Luzyanin, V. M. Pikunov]

UDC 621.385.69.01

[Abstract] A microwave Cherenkov device built on the basis of a periodic circular waveguide with semitorus-shaped irregularities is considered. The irregularities are formed by intersecting a torus generated by revolving a circle and a cylinder coaxial with the torus. A numerical method of finding dispersion characteristics of a microwave (SVCh) Cherenkov device designed on the basis of a high-energy electron accelerator is suggested. Galerkin's incomplete method is used for denoting the working equations. An example of calculating this device's dispersion characteristics in the case where the waveguide slow-wave propagation structure has periodic irregularities of the aforementioned shape is presented. Dispersion characteristics are calculated numerically on a computer using the AZIMUT program. It is shown the results may be used for developing Cherenkov devices of the traveling wave (LBV) and backward wave (LOV) tube type. References 8; figures 4; tables 1.

Contactless Microprocessor Interfaces of Railroad Automation Systems With Outdoor Entities

917K0289A Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 1, Jan 91 pp 12-14

[Article by O. K. Dreyman, D. V. Gavzov, M. V. Ilyukhin, Leningrad Railroad Engineers Institute]

UDC 656.259.1:681.325.5-181.4

[Abstract] Microprocessor-based railroad automation and remote control systems (MP SZhAT) under development and pilot operation in many countries and the difficulty of interfacing them with actuators (IO) are addressed. Methods of accomplishing this task by using reliability class 1 relays in interfaces (USO) are summarized; it is shown that contactless actuator control devices are more advantageous in microprocessor-based systems. The development of contactless switching circuits for actuator control and monitoring devices is analyzed; in so doing, all methods of designing contactless MP SZhAT circuit switching devices are divided into three categories: periodic programmed test checks of duplicated interface switching elements; programmed testing of the common control device of the duplicated system; and interfaces executed as contactless function generators with an asymmetric failure. Techniques for checking the serviceability of these types of switching devices are described. In the authors' opinion, the use function generators, such as DC/AC converters as interfaces is the most promising. It is shown that in using MP SZhAT, it is possible to solve the problem of ensuring traffic safety without using reliability class 1 relays in actuating circuits; it is also shown that the use of relays as sensors of input data, e.g., on the state of track circuits, can be eliminated. Figures 10.

Radio Communication in Linked Trains

917K0289B Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 1, Jan 91 pp 14-17

[Article by Yu. V. Vavanov, A. I. Yashin, VNIIZhA]

UDC 656.254.16:261.396.931

[Abstract] The development of radio communication in linked trains with distributed traction equipped with two-band ZhR-UK-LP radio stations as well as ZhR-3M and ZhR-3 radio stations is described. It is shown that to control linked trains, it is necessary to use locomotives equipped with the ZhR-UK-LP radio station which is newer and more advanced. This is especially important due to the intensification of railroad traffic. These stations utilize the meter band for operating inside the train; in some cases, especially over rough terrain and in tunnels, the hectometer band is also used. Methods of calculating the range and reliability of radio communication in the hectometer and meter bands are considered in order to select the channel realization method. This made it possible to identify the most characteristic cases of radio wave propagation under railroad transport conditions. Measurements were taken in the meter and hectometer bands. Calculations show that the meter band is more expedient for linked trains although in the number of cases the quality of communication in this band is inferior due to the poor preparation of equipment for operation, particularly as a result of the low receiver sensitivity, reduced transmitter output, and poor state of the antenna feeder circuit. The need to improve the servicing of meter band equipment, careful preventive maintenance, and technical preparation of radio equipment for operation on twin-train routes is identified. Figures 6; tables 3.

Using Electronic Concentrators in Telegraph Network

917K0289C Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 1, Jan 91 pp 23-25

[Article by I. P. Barbash, I. A. Zdorovtsov, P. F. Polyakov, B. M. Smolyanitskiy, Kharkov Railroad Transport Engineering Institute]

UDC 656.254.16:621.38

[Abstract] The use of channel switching centers (SKK) based on second generation switching technology (AT-PS-PD, APS-K, etc.) stations in the USSR Railroads Ministry (MPS) telegraph network is summarized and the SKK algorithm employing congestion and delay queuing system procedures as well as some of its shortcoming are outlined. It is shown that the use of message switching centers (TsKS) in the MPS telegraph network eliminates these shortcomings. The design and implementation of electronic message switching concentrators (ETK-KS) with a throughput of 0.17-0.7 messages per second depending on their configuration is described. ETK-KS is a microprocessor-based multicomputer system intended for designing centers for automatically receiving, switching, and transmitting telegraph messages. The expediency of using ETK-KS in MPS communication networks is demonstrated by measuring and summarizing telegraph traffic at one railroad within one telegraph office, five district offices, and seventeen station offices. As a result, the necessary telegram transmission rate at the peak load hour (ChNN) is determined allowing for the demand factor. Specific problems of ETK-KS implementation in the MPS telegraph network, primarily the development and implementation of hardware and software for the joint operation of channel and message switching centers using a common telegraph communication channel network, routine ETK-KS on site repair by quickly locating failed standard interchangeable modules (TEZ) and replacing them, etc., are identified. The need to train service staff to use ETK-KS is stressed. Figures 2; tables 2.

Bidirectional Highly Stable Wide-Band Amplifier

917K0289D Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 1, Jan 91 pp 25-28

[Article by Ye. Ye. Golikov]

UDC 621.375.123.3:656.2

[Abstract] The use of PTDU-67, PTDU-M, and ITUM bidirectional amplifiers in railroad communications gear with hybrid sets and balancing networks which ensure a low return current suppression is summarized. It is shown that the parameters of bidirectional amplifiers can be improved and their applications can be expanded by using integrated circuits as operational amplifiers (OU) capable of suppressing common mode voltage. This property can be employed for suppressing the return signal by using an OU instead of the hybrid set as well as using OU's as amplifying elements in forward and return directions in the bidirectional amplifier. The values of crosstalk attenuation in an OU used to suppress return currents allowing for the dependence of amplified signal on frequency are summarized. It is shown that the above IC-based bidirectional amplifiers may have a positive effect: if used in on-line intercom devices operating over cable lines with physical circuits in the audio frequency band; with a higher degree of return current suppression and stability than in amplifiers with hybrid sets; or when more than three amplifiers are linked to the same circuit. The use of the above bidirectional amplifiers is also expedient in combination with existing terminal devices to form additional transmission systems. Figures 2; tables 3.

All-Purpose Meter of ALSN Code Time Parameters

917K0289E Moscow AVTOMATIKA, TELEMEKHANIKA I SVYAZ in Russian No 1, Jan 91 pp 33-34

[Article by V. I. Parashchenko, Southwestern Railroad Design Office]

[Abstract] The design of a device for measuring the mark and space duration of ALSN codes in 25 Hz track circuits with alternating current traction as well as the duration of open or closed state of transmitter relay (TR) contacts is proposed. The measured quantity is displayed digitally at a 0.02 s interval for the rail and 0.01 s interval for the transmitter relay contacts. A block-diagram of the device is cited and its operating principle is described. The device uses one 3336 battery for power supply whereby all LED displays are fed directly from the battery and the remaining elements - from a transistor voltage converter. The device is executed on series 176, 561, and 140 chips and low-power commercial transistors. Its has 165x86x54 mm overall dimensions and a mass of about 600 g together with the battery. ALSN operating experience shows the expediency of using it in remote signaling and communication. Figures 2.

Method of Determining Dynamic Response in Using Real Test Signal

917K0288A Moscow IZMERITELNAYA TEKHNIKA in Russian No 1, Jan 91 pp 9-10

[Article by I. V. Boykov]

UDC 621.317.726.082.1

[Abstract] The functioning of linear measurement devices characterized by a unit step response and a transient response is described. Since the transient response governed by GOST 8.009-84 is measured with a step input function which is difficult to realize, real test signals used in practical applications are examined. Stringent requirements are imposed on real test signals due to the fact that in determining the transient characteristics by the device's response to a step input function, considerable errors appear. The cause of these errors are analyzed in implementation of one of the most common methods of determining the transient response. It is shown that significant errors appearing in this and other methods are related to the input signal differentiation which is a flawed procedure. A method of determining the unit step response and transient response to random test signals is proposed. The method is shown to have good filtering properties and being capable of reducing the additive noise level considerably. It is assumed that input and output signals are finite. References 6.

Analysis of Integrated Information System Pickups

917K0288B Moscow IZMERITELNAYA TEKHNIKA in Russian No 1, Jan 91 pp 10-12

[Article by L. E. Shvartsburg]

UDC 53.087.92:002:681.3

[Abstract] The expanding use of digital velocity and position pickups in today's information systems, e.g., feedback systems of controlled and servo electric drives, motion counters, etc., is described and their advantages, such as the wide actuator speed control range, high motion precision, and wide transmission band are outlined. Yet most of existing digital systems do not have the requisite accuracy within the entire control range and are incapable of ensuring the necessary discreteness of 0.1-0.2 μm at an information readout frequency of 2 MHz. Ways of resolving these problems by integrating pickups on the basis of realizing the actuator position function model are discussed. It is shown that such systems should be used not only for obtaining information about position or velocity but also in each control channel of multichannel systems. Characteristic features of integrated feedback systems are examined, particularly the fact that measurement data are formed in integrated systems allowing for dynamic actuator motion errors in the intervals between adjacent pickup pulses. The analysis demonstrates that integration of data makes it possible significantly to increase the quality of information systems by relatively simple methods and ensure their performance within the entire requisite measurement range. The economic efficiency of using such systems is demonstrated. References 2; figures 2.

Pulsed Electromagnetic Field Transducer Analysis

917K0288C Moscow IZMERITELNAYA TEKHNIKA in Russian No 1, Jan 91 pp 41-43

[Article by S. A. Podosenov, A. A. Sokolov]

UDC 621.317.42.087.92

[Abstract] The conversion factor of a pulsed electromagnetic field transducer based on a section of a two-wire line matched at both ends is calculated in the telegrapher's equation approximation. It is shown that the use of symmetric two-wire lines with air insulation or equivalent single-wire lines parallel to the conducting plane as transducers instead of the stripline eliminates the complications related to the fringe effect and difficulties of measuring the dielectric permittivity accurately. The analysis of this line excitation by a step TEM-wave's electromagnetic field is based on solving the problem interaction of two identical conducting cylinders whose axes are parallel to each other with a uniform quasisteady intersecting electric and magnetic waves. References 2; figures 1.

Increasing Noise Immunity and Accuracy of Self-Circulating Ultrasound Velocimeters

917K0288D Moscow IZMERITELNAYA TEKHNIKA in Russian No 1, Jan 91 pp 48-49

[Article by M. Ye. Unksov, B. Ya. Shpichenetskiy]

UDC 534.614.088.6:534.321.9

[Abstract] The use of self-circulating oscillations in electronic circuits intended for measuring the speed of ultrasound is outlined and their shortcomings are described. Steps aimed at increasing the noise immunity of self-circulating oscillation circuits, i.e., eliminating the possibility of triggering them by other than legitimate signals thus making it possible to lower the triggering level and triggering errors are considered. To this end, a simple and efficient solution suggested by the authors, i.e., adding an uncontrolled delay line in series with the circuit, is presented. The design of the resulting device for measuring the speed of ultrasound in an automatic mode and its operating principle are summarized. It is shown that the use of the self-circulating oscillation circuit with a noncontrolled delay line makes it possible considerably to decrease the triggering signal level and eliminate the resulting errors caused by changes in the medium parameters. An increase in the device's noise immunity expands its applications to the area of small volumes of liquid and biological media, i.e., less than 10^{-6} m^3. In addition, the possibility of manipulating the distance between piezoelectric transducers makes the device suitable for nonintrusive monitoring of the state of biological objects, particularly isolated organs. References 2; figures 2.

On Decreasing Energy Dependence of Silicon Detector Sensitivity

917K0288E Moscow IZMERITELNAYA TEKHNIKA in Russian No 1, Jan 91 pp 49-50

[Article by B. A. Nikitin, V. M. Budnitskiy, I. I. Kovalev, T. V. Nikolayeva, G. A. Volodina, G. Ye. Romanova]

UDC 539.1.074.089.52

[Abstract] The dependence of a silicon detector sensitivity on the ionizing radiation energy is analyzed; it is shown that by decreasing this dependence one can substantially increase the measurement accuracy within a broad range of γ-quanta energies. Characteristic spectra of γ-radiation obtained with the help of a silicon detector with a five min exposure using ^{137}Cs and ^{60}Co radionuclides with γ-quanta energies of 662 and 1,255 keV, respectively, are presented and the pulse energy distribution function is approximated. It is established that the detector's dose sensitivity decreases noticeably with an increase in the γ-quanta energy. An analysis of the resulting data shows that the detector's charge sensitivity changes by no more than 3 percent with a doubling of the γ-quanta. It is also noted that sensitivity vs. energy plots are almost linear, making it possible substantially to decrease the uncertainty of determining the dependence of the absorbed dose on the discrimination threshold. References 2; figures 2; tables 1.

Automated Sound Level Meter Testing Workstation

917K0288F Moscow IZMERITELNAYA TEKHNIKA in Russian No 1, Jan 91 pp 59-62

[Article by M. Z. Geykhman, V. P. Sosnovskaya, E. I. Tabachnik, Ye. I. Tunik]

UDC 65.015.12.011.56:534.322.3.089.6

[Abstract] A computer-aided workstation for certifying class 1, 2, and 3 sound level meters (ARMP Sh) with a condenser microphone developed and put in pilot operation at the Belorussian Standardization and Metrology Center is described. The ARMP Sh consists of an AKSAMIT-A computer-instrument system designed on the basis of an Elektronika 0507 microcomputer which controls the certification process, receives measurement data over a common bus (KOP) with the help of an UVV-3 device, processes and analyzes them, and prints out the certification results. The most labor-consuming testing operations, e.g., determining the sound level meter frequency response (ChKh) to voltage, band selector errors, amplifier amplitude response irregularity, and nonlinear distortions. are automated. The ARMP Sh block-diagram is presented and its operating principle is described in detail. The main program routines used for certifying sound level meters are described. The principal metrological characteristics are obtained by statistical processing of data produced by at least ten runs of the certification software performed during several days at various hours. The advantages of ARMP Sh, including the use of commercially produced components, are outlined. References 4; figures 1.

Radar Glint Noise: Survey

917K0263A Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 3-10

[Article by P. A. Bakulev, G. G. Dzhavadov, D. A. Sokolov]

UDC 621.396.967:621.391

[Abstract] Glint noise (ShM) - random changes in the direction of the echo signal arrival - discovered in tests of the early monopulse systems is addressed. It is shown that glint noise is actually determined not by the properties of radar systems but by random fluctuations of the normal to the field's phase front. Today's state of efforts to simulate, and compensate for, radar target glint noise which affects the accuracy of radar (RLS) performance is analyzed. Position estimation algorithms invariant to glint are cited. The following priority tasks are identified: to search for and synthesize new position estimation algorithms invariant to ShM; to search for and synthesize algorithms for protecting existing radar from the effect of ShM; to develop radar signal simulation algorithms adequate to the reality of amplitude and radar echoing center (phase center) (RLTsO) glint fluctuations; to analyze the statistics of the wandering vector quadrature components and joint distribution of the phase center and signal strength distribution; and to examine the effect of the AGC system on the glint signal processing and the resulting radar accuracy. References 28: 19 Russian; 9 Western.

Integral Approximation Method Application in Problem of Optimal DPSK Signal Detection

917K0263B Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 17-21

[Article by Yu. N. Kirillenko]

UDC 621.391.266

[Abstract] An integral criterion which takes into account the proximity of the approximating *a posteriori* probability density (AOV) to true density and makes it possible to avoid the small filtering error assumption is suggested for synthesizing the algorithms of signal detection with randomly varying parameters. A new method of synthesizing discrete continuous filtering algorithms based on minimizing Kullback's integral measure for confounded *a posteriori* distributions is illustrated by solving the problem of optimal detection of differential phase-shift keyed (OFM) signals. The resulting algorithm of joint estimation of the discrete parameter and randomly varying signal phase lends itself to graphic geometric interpretation and makes it possible substantially to shorten the transient operation time by two-to threefold compared to the conventional Gaussian approximation (GA) method. The noise immunity of the synthesized algorithm during the synchronism recovery was analyzed by computer simulation. The results show that it is expedient to use the integral approximation method in synthesizing algorithms of discrete continuous filtering of digital signals. References 5; figures 2.

Quasioptimal Discrete Signal Demodulation Against Background of Additive and Multiplicative Non-Gaussian Noise

917K0263C Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 26-30

[Article by O. I. Shelukhin, A. F. Fomin, V. M. Artyushenko]

UDC 621.376.43

[Abstract] Known data in the field on filtering are extended to a case where a signal is simultaneously affected by additive and multiplicative noise whose probability distribution densities (PRV) generally differ from Gaussian. It is assumed that the likelihood function logarithm (LFP) exists and that it can be expressed by relatively multiplicative and relatively additive noise components. Synthesis of quasioptimal signal demodulation algorithms under the effect of multiplicative and additive noise is considered using the method of Markov's nonlinear filtering theory. A comparative estimate of algorithms under study is cited. As a result, recurrent algorithms are synthesized for the cases of both joint and individual effect of non-Gaussian noise. Specific expressions are derived for the steady-state *a posteriori* PM signal demodulation variance under the simultaneous effect of fast and slow multiplicative noise with an *m*-distribution and additive noise with a bimodal PRV. It is shown that these expressions are identical. The algorithms' demodulation accuracy and complexity are compared. References 3; figures 3.

Cross-Correlation Function of RF Thermal Surface Signal During Space Diversity Reception

917K0263D Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 30-33

[Article by S. Ya. Kolmakov, L. F. Chukin]

UDC 621.391.81.61

[Abstract] It is shown that interferometry reception is preferable to single-channel reception in radiometry probing of the earth's surface from an aircraft (LA) and makes it possible considerably to increase the quality and reliability of data on the surface radiothermal image. A statistically uneven and uniform isotropically emitting surface whose thermodynamic temperature is characterized by the complex permittivity and random geometric irregularities with a known RMS irregularity height, correlation radius, and gradient is used as the surface model. The signal received by the LA antenna is represented as a combination of partial signals. The proposed phenomenological model of the earth's RF thermal radiation is used to derive an asymptotic expression for the cross-correlation signal function during the space-diversity reception. The

interferometer-radiometer resolution in two perpendicular planes is estimated. It is shown that in the framework of the adopted model in the case of centimeter band radiometry, the accuracy and reliability of the resulting data on the surface radiation characteristics may be increased by decreasing the size of the surface area selected by the interferometer compared to that of the spot illuminated by the antenna beam pattern (DNA) on the underlying surface. References 1; figures 2.

Determining Number of Noise Radiation Sources During Their Parallel Direction Finding

917K0263E Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 34-37

[Article by V. N. Manzhos, M. L. Rudnev]

UDC 621.396

[Abstract] Three methods of determining the number of noise radiation sources during their parallel direction-finding are considered on the basis of a sheaf of matrices of the generalized problem of eigenvalues and correlation and cross-correlation matrices. The problem is solved by digital simulation of an adaptive direction-finder based on two 10-element antenna arrays (AR) with five preformed spatial channels shifted relative to each other in the azimuthal plane by one-half of the operating wavelength. Two noise radiation sources with an identical relative power (relative to intrinsic noise) whose angular coordinates are defined in generalized angular units expressed as a percentage of the matched radiation pattern (DN) half-width of one antenna array at a zero level were used in direction-finding. A method of simplifying a known parallel direction-finding algorithm for a case of radiation sources weakly correlated in space is presented. The results of mathematical modeling of the above parallel direction-finding methods are cited. It is shown that in using the parallel direction-finding method in a complex noise environment, it is expedient to represent the number of noise sources by analyzing the eigenvalues of the cross-correlated matrix. References 2; figures 3.

Experimental Investigation of Entropy Minimax Method

917K0263F Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 42-45

[Article by V. V. Savchenko, D. Yu. Akatyev, A. N. Kostyunin]

UDC 621.317.7

[Abstract] The conclusions of a theoretical analysis are verified and further developed by experimentally investigating a digital proximate energy spectrum analyzer in which the entropy minimax method (MME) is implemented for the first time. The method has a high resolutions even in the case of small observation samples. The results of a theoretical examination of spectral analysis by MME are cited, the block-diagram of an experimental unit developed for this purpose is presented, and qualitative characteristics of the method under study are described. The energy spectrum of a random time series is found from the amplitude-frequency response of a decorrelator adapted for the process under study over the analysis interval. The results demonstrate the advantages of MME over one of the best known nontraditional spectral analysis methods - the maximum entropy (ME) method - with respect to its accuracy and speed of response as well as computation time. The digital proximate energy spectrum analyzer developed on the basis of the method is characterized by high technical and operating indicators which cannot be attained by other known software and hardware. References 4; figures 3.

Optimization of RF Instruments for Airborne Laser Velocimeters

917K0263G Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 46-51

[Article by A. A. Sosnovskiy, S. N. Khaykin]

UDC 621.396.6

[Abstract] An attempt is made to address the issue of reliability, small overall dimensions, and high noise immunity of RF instrument channels (RIU) operating on-board aircraft (LA) which is generally ignored in publications dealing with airborne laser velocimeters (LIS). Certain issues of optimizing RF instrument channels and device for airborne Doppler LIS's are considered. A promising method of time gating of random interferences is suggested and investigated. A system of criteria is proposed and a technique for their comparative analysis in the course of computer-aided design is developed. A well-known RIU design which realizes a combined method of dividing the Doppler frequency band under study into several equidistant expansion elements with a given analysis bandwidth of each element is used. The spectrum is divided into wide channels each containing a filter and a detector. It is noted that data on the test table output and criterial constraint input make it possible not only to impose criterial constraints but also to establish particular relationships between individual RIU parameters while recording the remaining parameters; as a result, the CAD program becomes an all-purpose tool for investigating similar devices. References 7: 6 Russian, 1 Western; figures 3.

Fading Model of VHF-UHF Mobile Radio Communication Channel Operating Over Moderate Terrain

917K0263H Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 52-56

[Article by A. Ye. Rynkov, V. Ye. Fedyayev]

UDC 621.396.2:621.317.32

[Abstract] An analytical model is developed for describing the fading of the signal envelope allowing for both interference and diffraction components of total reception

signal energy losses during the communication object motion over a moderate terrain. Analytical estimates of the mean variation periods of the radio channel energy state as a function of real parameters of a meter band mobile communication system during operation over a moderate terrain are derived. Graphic plots of the radio channel stability vs. terrain features and radio link energy parameters are cited. A computer realization of the above model makes it possible comprehensively to examine the effect of various mobile communication system parameters in order to select efficient methods of preventing signal fading. The results show that the average signal envelope fading duration relative to the selected level varies from fractions of a second to tens of seconds whereby the signal envelope fluctuations at the reception point are determined only by the multipath effect. It is shown that a set channel quality may be attained by proper selection of relay-bypass communication paths which ensure the necessary SNR by collecting statistical data on the energy and dispersion properties of various radio paths during the operation of the system. References 7; figures 2.

Binary Signal Parameter Discrimination During Digital Processing

917K0263I Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 63-66

[Article by A. I. Velichkin, V. Yu. Yakovlev]

UDC 621.391.26

[Abstract] The problem of signal discrimination on the basis of digital sampled data necessitated by the emergence of digital computer systems in the field of signal detection is considered. An analog signal and noise mixing process on the input where the signal represents a deterministic function of two parameters, the intelligence binary time and discrete time, is examined; the binary parameter represents a discrete-value sequence of independent random quantities which assume one of the two possible values (0 or 1) with an identical *a priori* probability of 0.5. A data bit corresponds to a significant discrete time interval consisting of a given number of samples. The observation noise is represented by a sequence of Gaussian independent random values with a null mathematical expectation and a given variance. The digital detector noise immunity is estimated in the case of receiving square pulses at a constant level within the significant interval. During the digital processing, the signal and noise mixture was sampled in an analog-to-digital converter (ATsP). The error rate and erroneous digital signal combinations were determined. All calculations were made on a digital computer. The results show that the digital receiver noise immunity substantially depends on the number of samples over the significant interval. Given four or more sampling areas, the digital receiver noise immunity virtually coincides with that of the analog receiver. References 2; figures 1.

Asymptotic Bahadur Efficiency of Certain Detection Tests in Spectral Space

917K0263J Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 66-69

[Article by G. S. Fedorov, R. P. Filimonov]

UDC 519.24::621.391.2

[Abstract] The quality of local criteria is estimated and compared with the help of Bahadur's asymptotic relative efficiency (AOE) concept. According to Bahadur, the measure of effectiveness (ME) of the statistic used to check the zero hypothesis alternative is its precise slope. Its existence calls for meeting certain standard conditions. It is shown that logarithmic contrast and simple contrast parametric criteria and nonparametric criteria based on ranking statistics, i.e., Wilcoxon's two-sample statistic can also be used in the problem of detecting a deterministic signal in a spectral space. These criteria, as a rule, appear in detection problems when there is an additional requirement that the statistic be invariant to the noise level. The resulting local values of precise slopes are summarized and compared to the values of Pitman's ME's. These data make it possible to conclude that as the number of degrees of freedom increases, the asymptotic efficiency of the tests under study approaches unity, thus enabling us to speak of statistical equivalence of the aforementioned criteria with a large number of degrees of freedom. References 4: 2 Russian, 2 Western; tables 2.

Effect of Truncation on Measure of Efficiency of Certain Invariant Detection Criteria

917K0263K Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 69-71

[Article by G. S. Fedorov]

UDC 519.24; 621.391.2

[Abstract] Using a specific detection case as an example, the effect of sample truncation on the optimality and effectiveness of two criteria of postdetector discrimination of weak signals is examined in order to predict the performance quality of detectors. Truncation is usually necessitated by dynamic range limitations in individual elements of real detection systems. The problem is solved in the spectral space which corresponds to noise described by a χ-square distribution with a given number of degrees of freedom. Technical difficulties associated with computing the measure of efficiency (ME) are described. The computation results are cited. It is noted that truncation in the case under study does not change the structure of the local detection criteria synthesized for a standard noise environment. The results demonstrate that truncation has a dual effect on optimality and asymptotic efficiency: on the one hand, after truncation the criteria retain the property of local optimality while on the other, since the threshold constant depends on the scale parameter, truncation leads to a loss of the criteria invariance to the scale parameter and simultaneously decreases their ME. Consequently, the effect of truncation may be ignored in detecting weak signals. This estimate is recommended for determining the dynamic range of detection devices under development. References 4.

Analysis of Hierarchical Algorithms of Image Overlap Against Background of Spatial Local Noise

917K0263L Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 75-78

[Article by V. A. Gorokhovatskiy, V. V. Shlyakhov]

UDC 519.24

[Abstract] The advantages of the hierarchical method before traditional with resect to the composite error probability when the target signal is under the effect of fluctuation and local noise are demonstrated. The method of image fragmentation is used to analyze a situation where two types of noise are present: additive noise with a given distribution law and local noise with a given distribution law. The probability of each type of noise at each point is defined by a law characterized by a set of discrete random quantities, i.e., the noise indicator. It is assumed that noise values are independent while their distribution does not depend on the coordinates; thus, noise indicators represent a set of independent random quantities whose distribution depends on the coordinates. The comparative relative efficiency of the known and hierarchical algorithms was calculated on a computer. The results make it possible to draw the conclusion that hierarchical algorithms are preferable and more adaptive under the effect of local noise; these advantages become reinforced with an increase in the difference between the noise and target luminance. References 2; figures 1.

Synthesis of Optimal Transmitter of Single-Sideband Companded Signals

917K0263M Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 91-94

[Article by A. A. Volkov]

UDC 621.396.61

[Abstract] On optimal transmitter of single-sideband amplitude-modulated companded (OBPK AM) signals is synthesized by the maximum average efficiency criterion at a given optimal ratio of its single sideband frequency-modulated (ChMO) and compressed speech (KO) components which determines the maximum of communication noise immunity and a minimum level of output signal's nonlinear distortions. In particular, a Lincompex SSB AM system is considered. It is shown that the synthesized transmitter has the maximum energy indicators due to the fact that SSB oscillations formed on a common carrier by a compressed speech signal and its FM envelope are separately amplified and subsequently composed while maintaining their optimal level ratio and due to eliminating the carrier oscillation reconstructed during the compression of the primary SSB signal. A method of eliminating the carrier oscillation reconstructed during the primary SSB signal compression is proposed, making it possible additionally to suppress the spurious sideband. References 7: 6 Russian, 1 Western; figures 2.

Features of Optical Band Receiver Sensitivity Estimation

917K0263N Kiev IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: RADIOELEKTRONIKA in Russian Vol 34 No 1, Jan 91 pp 94-96

[Article by N. F. Vollerner]

UDC 621.396.029.7+621.396.089.52

[Abstract] The following features of estimating the sensitivity of optical band receivers are considered: the low intrinsic noise level in the receiver input circuit before the photoconverter (FEP) in crystal receivers at normal temperatures; noise in the laser signal frequency amplifier (USCh) in tuned RT receivers and the frequency converter in superheterodynes without an USCh; characteristics features of the FEP which functions as an energy quanta counter; and the presence of a specific equivalent photon quantum noise in the optical signal. Thermal radiation fluctuations of the circuit which determine its intrinsic noise are examined. An expression is derived for calculating the signal/noise ratio; it is not suitable however for determining the photon quantum noise level since it depends on the signal's optical power. The limit of the optical receiver sensitivity is calculated. References 3.

Electromagnetic Processes in Linear Induction Motors Allowing for Secondary Body Conductivity Changes by Length

917K0266A Kiev TEKHNICHESKAYA ELEKTRODINAMIKA in Russian No 1, Jan 91 pp 8-13

[Article by P. A. Vishtak, I. P. Kondratenko, V. A. Krutilin, A. P. Rashchepkin, Electrodynamics Institute at the Ukrainian Academy of Sciences, Kiev]

UDC 621.313.39:537.811

[Abstract] Electromagnetic processes in the gaps of a linear induction motor are examined in a model of an infinitely long and wide double-sided three-phase linear induction motor field structure in whose air gap a bidirectionally infinite nonmagnetic metal strip is moving along the axis at a given velocity whereby the strip's conductivity is a function of its axial coordinate, i.e., varies with length. Analytical expressions are derived for calculating the magnetic fields of currents and Joule's losses in the case of ideal slotless cores. It is shown that conductivity variations with the field structure length lead to a nonuniform Joule loss distribution along the field structure length and a significant field structure current phase asymmetry and affect the induction motor's energy characteristics. The resulting simple expressions may be useful in engineering analyses. The transverse fringe effect caused by the field structure's and secondary body's finite width is ignored in the model. References 8; figures 4.

New Approach to Analyzing Observability and Checking Telemetry for Estimating Electric Power System Condition

917K0266B Kiev TEKHNICHESKAYA ELEKTRODINAMIKA in Russian No 1, Jan 91 pp 92-97

[Article by Z. B. Kremens, Wroclaw Polytechnic Institute, Poland]

UDC 621.311.16

[Abstract] A technique and two-stage algorithm for filtering out gross errors are cited. The technique and the algorithm are necessary for use in on-line control systems. The algorithm for estimating the state of electric power systems includes the measurement checking and observability analysis stages which precede the state vector estimation. The changing role of data verification algorithms in data processing structures is reviewed and a data analysis procedure is suggested. The interrelation of observability checks and tests is outlined and the detection algorithm—the first stage in data analysis—is examined. The error identification algorithm in problems of network power transfers is analyzed. It is shown that the proposed technique is an extremely simple decomposed power system telemetry data validity verification algorithm which calls for two-layer processing. A nonlinear model of a small entity (branch) is used at the first step and at the second - models which have much greater dimensions but are linear. Gross errors are detected by the group elimination method. This method's additional advantage is the algorithm's suitability for rapid simultaneous checks of topological observability for active and reactive power transfers. References 4; figures 2.

Detecting Moving Ferromagnetic Objects Behind Plane Screen by Induction Method

917K0266C Kiev TEKHNICHESKAYA ELEKTRODINAMIKA in Russian No 1, Jan 91 pp 104-110

[Article by A. P. Popov, M. R. Vinokurov, Omsk Polytechnic Institute]

UDC 621.317.3.321

[Abstract] The possibilities of using the induction method for detecting moving ferromagnetic objects behind a plane steel screen in a dielectric space are considered and the induction method's sensitivity is estimated; the method is necessary for controlling the motion characteristics of various objects or identifying the type of parts passing through the control zone in the case where screening is essential but there are no alternatives. The operating principle of the device is described. The calculation results are cited. It is shown that the sensitivity of detecting ferromagnetic objects behind a plane screen depends on the degree of the screen's magnetic saturation, the object shape and velocity, and its distance to the screen plane. References 3; figures 3.

Interaction Model of Parallel Asynchronous Discrete Processes

917K0287A Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 3, Mar 91 pp 113-142

[Article by A. Yu. Klug, S. A. Yuditskiy, Control Problems Institute, Moscow]

UDC 681.51

[Abstract] A method of analyzing process systems on the basis of the coherence principle with respect to interactions belonging to the class of message transmission over a channel with no more than one message already in the channel (i.e., directional interaction of various process crosstalks) is presented. In contrast to rendezvous interactions, coherence is understood as the possibility of realizing in the system only a few rather than all versions of component behavior and the need to modify this behavior by barring the remaining versions. A model of a system of asynchronous interacting parallel discrete processes is suggested; the system ensures transmission of physical and/or information resources between processes without a shutdown. The model referred to as a system of directionally interacting automata graphs (SINVAG) is based on the above directional interaction operation. The set of concepts underlying the model is defined. The method of Petri's automata trees is used in examining the SINVAG model. References 6; figures 2; tables 2.

Synthesizing Self-Checking Compact Diagnostic Systems

917K0287B Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 3, Mar 91 pp 153-159

[Article by I. P. Litikov, International Informatics and Electronics Center, Moscow]

UDC 519.718

[Abstract] The development of a universal diagnostic means, a built-in controller for checking test generator and signature analyzer logic units, is described and an algebraic method of synthesizing the circuit design for such devices is presented. An M-sequence generator whose properties are similar to those of a random Bernoulli sequence is used as the diagnostic entity. The generator is executed on delay elements (i.e., synchronous flip-flops) and a modulo 2 adder. It is shown that the proposed solution is common to the generator and signature analyzer, making it possible to design all-purpose self-checking diagnostic elements based on built-in logic unit controllers thus realizing the possibility of developing fully self-checking LSI circuits supplied with compact test and functional diagnostic tools. The resulting data may be extended to multichannel signature analyzers and ring testing devices. References 5: 4 Russian, 1 Western; figures 3.

Digital-to-Analog Converter Error Checking and Correction Allowing for Digit Interaction

917K0287C Moscow AVTOMATIKA I TELEMEKHANIKA in Russian No 3, Mar 91 pp 168-173

[Article by R. M. Grushvitskiy, B. A. Manchev, A. Kh. Mursayev, V. B. Smolov, Leningrad Electrical Engineering Institute imeni V. I. Ulyanov (Lenin)]

UDC 631.325

[Abstract] The use of information notation converters (PFI) in automatic control, measurement, and diagnostic systems is discussed. The selection of a model and testing plan for checking a digital-to-analog converter (TsAP) - the most significant element of most PFI's - is described. A method of checking the performance and automatically correcting precision PFI's by evaluating the parameters of a DAC model which takes into account nonlinear discrete divider effects on the basis of test results is presented. The differential measurement method makes it possible to check DAC's by using a meter whose absolute error is on the same order of magnitude as that of the controlled entity; it can also be used in a situation where the controlled DAC error is beyond the correctable range. The above control method may be used not only for PFI self-correction under operating conditions but also for periodically checking converters and adjusting PFI's during their manufacturing. The proposed approach to checking and correction based on using differential measurements and optimizing test results may also be used with more accurate or simpler models. References 7: 5 Russian, 2 Western.

On Efficacy of Suspending Telephone Cables From 0.4 kV Power Transmission Line Supports

917K0241A Moscow VESTNIK SVYAZI in Russian No 2, Feb 91 pp 19-20

[Article by V. F. Kalyuzhnyy, I. D. Shneyder, Moscow Communications Institute]

[Abstract] The thirteenth five-year plan calls for developing telephone exchanges with a total capacity of 23 million numbers and 90 million by 2000; problems related to shortages of wooden and reinforced-concrete supports, asbestos-cement and polyethylene piping, armored cables, etc., needed to meet this plan are summarized. It is shown that this task can be accomplished by using 0.4 kV light and power transmission line supports (LEP-0.4 kV), which reach almost every village home, for carrying telephone cable; these supports are already used for wired radio broadcast systems. In so doing, telephone cable can be hung from the same poles at the radio wire level but on the other side of the supports. Seven different versions of suspending telephone cable from LEP-0.4 kV and the necessary equipment and safety measures required for installation are summarized. Capital outlays required by all seven versions are compared and the calculation results are summarized. It is shown that version "Zh" (No. 7) - joint suspension of TPP 10x2x0.5 cable - is preferable. According to computations, the use of power lines for telephone cable lowers capital outlays for construction by two-two and a half times and decreases operating costs by one and a half-two and a half times compared to other methods. Figures 1.

DR DOS: Increased Security

917K0241B Moscow VESTNIK SVYAZI in Russian No 2, Feb 91 p 21

[Article by Yu. Yu. Vasilenko, Semipalatinsk Communications Directorate]

[Abstract] A new operating system (OS) for IBM-compatible microcomputers which has been undergoing tests at the management information systems division (ASU) of the Semipalatinsk Communications Production Technical Directorate (PTUS) since January 1990 - the DR DOS - is described. The new version 3.40 and 3.41 operating system was developed in 1988-1989 by the Digital Research company; it is a single-user single-program system with greater capabilities than DOS 3.40 and matches those of DOS 4.0. The new operating systems enables the user to set different access categories for files and directories by using passwords; it is distinguished by new system installation procedures operating with a full-screen menu, disc memory allocation software similar to the one used in DOS 4.0 (with a volume of up to 512 Mbyte), memory server software similar to LIM 4.0, a full-screen text editor with Wordstar, new peripheral drivers, and built-in external routines. The DR DOS system was tested on MAZOVIA CM 1914 and YeS-1840 computers and found to be compatible with DBMS and Borland compilers. The DR DOS system is recommended for replacing MS DOS 3.20 and 3.30 and has been incorporated by some IBM clone manufacturers as a standard feature.

Standard Replacement Module Diagnostic and Repair Workstation for 'Kvant' Quasielectronic Exchange

917K0241C Moscow VESTNIK SVYAZI in Russian No 2, Feb 91 pp 22-23

[Article by A. I. Chernyshev, Chernigov Communications Directorate]

[Abstract] The standard replacement module (TEZ) diagnostic and repair workstation for the Kvant quasielectronic automatic telephone exchange (ATSKE) developed at the industrial laboratory of the Chernigov Production Technical Directorate is described. Its implementation made it possible to repair TEZ's on site instead of sending them to the manufacturing plant; moreover, any type of repair can be performed by workers who do not have specialized training, e.g., electrical technicians. The new workstation reduced the fault location time to a minimum - 40 min on the average. The workstation makes it possible to check the serviceability of digital devices on the basis of series 155 TTL chips with up to 64 inputs and 64 outputs and, if necessary, repair them. The block diagram of the workstation is presented and its operation is described in detail. The workstation employs a DVK operating system and GS.SAY control program. Figures 1.

Capacity of Digital Radio Relay Communication Links Will Increase

917K0241D Moscow VESTNIK SVYAZI in Russian No 2, Feb 91 pp 24-26

[Article by V. M. Minkin, L. M. Grozovskiy, V. V. Odintsov, E. A. Sukachev, N. K. Mikhaylov, Radio Scientific Production Association and Odessa Telecommunication Institute]

[Abstract] The OTsF-8 digital terminal equipment used today for setting up digital channels over radio relay (RRL) communication links is described. The development of this equipment was necessitated by the increasing need for digital multichannel frequency-modulated (ChM) frequency division multiplexed (ChRK) telephony. OTsF-8 equipment serves as an interface between digital transmission systems (TsSP) and analog radio relay transmission system (RRSP) equipment. Another type of equipment - OTsF-17 - capable of transmitting two digital signals at a rate of 2x8.448 Mbit/s over one analog area-wide radio relay link channel developed for increasing the analog radio relay channel capacity is described. Block-diagrams of OTsF-8 and OTsF-17 equipment racks are cited and their modifications and characteristics are presented. OTsF-8 equipment is currently in operation in a number of radio relay lines while OTsF-17 equipment has been tested in an operating radio relay link; blackouts due to an increase in the error rate to 10^{-3} were observed when the signal power dropped to -104 dBW on the receiver input. Tests show that audio frequency channels meet standard

requirements. The use of OTS-8 and -17 racks makes it possible to increase the number of channels to 240 and 480, respectively, and meet the need of area-wide communication. Figures 4.

'Istok' Operation Center

917K0241E Moscow VESTNIK SVYAZI in Russian No 2, Feb 91 pp 28-29

[Article by V. Ya. Naumov, V. F. Plotko, V. D. Feygman, I. G. Lemberskiy, Rostov Branch of the Communications Research Institute]

[Abstract] The Istok operation center intended for servicing rural telephone networks (STS) in administrative regions with an Istok central integrated automatic quasi-electronic telephone exchange station (IATSKE) is described. The center represents a hardware complex for organizing rural telephone network operation with one-to-four IATSKE1 Istok stations or with ATSK 50/200 and ATSK 100/2000 crossbar automatic telephone exchanges (ATSK). Up to 64 IATSKE1 or ATSK 50/200 can be connected to one IATSKE1. Large-scale implementation of Istok stations calls for further improving rural telephone network operation methods. It is shown that this can be achieved by setting up such operation centers (TsTE). TsTE's use DVK-3M microcomputers with a set of peripherals, a telegraph channel controller (KTLK), standard interfaces, an emergency signaling display (TAS), and software. In the future, Istok TsTE's could be used for servicing other stored-program exchanges, such as Kvant. An Istok TsTE is currently operating in Latvia. Figures 1.

Inductive Energy Storage and Certain Issues of Increasing Power System Reliability

917K0284A Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 2, Feb 91 pp 25-28

[Article by Yu. S. Petrusha, Belorussian Polytechnic Institute]

UDC 621.311.004.13.003.1+621.319.4

[Abstract] Superconductor magnetic system-based inductive energy storage (SPIN) used as devices actively controlling the power and electric energy flux in electric power systems (EES) are considered. The use of SPIN's to increase the efficiency of intersystem links (SPIN MLEP), voltage quality in nodes with a distorting load (SPIN PKN), and dynamic stability of high-power synchronous load units (SPIN PUSN) is analyzed in detail from the viewpoint of estimating the resulting economic impact. Principal attention is focused on quantitative characteristics of the anticipated effect on the assumption that the essence of the model used is described in *Izvestiya vuzov: Energetika* No 3, 1988, pp. 112-119 and *Informenergo* publication No. 3247, 1990. The analysis shows that the expected economic effect from using inductive energy store ranges from several tens of thousands to thousands of rubles per 1 kW of available storage capacity; the range of the specific impact reflects the sets of the most and least favorable design conditions for estimating the economic impact; a comparative estimate of the economic impact of energy storage for various functional purposes can be made only after analyzing the cost of SPIN proper which due to technical differences may vary greatly. Finally, it is noted that the resulting model of estimating the SPIN PKN economic impacts is somewhat methodologically uncertain due to the general problems of valuating and controlling the voltage quality. References 9; tables 3.

Lightning Surges in Generator Voltage Networks and Protection Against Them

917K0284B Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 2, Feb 91 pp 38-44

[Article by Zh. V. Yefremova, K. P. Kadomskaya, Novosibirsk Electrical Engineering Institute]

UDC 621.315.2.015

[Abstract] Two maxima observed in the voltage curve on the low-voltage (NN) side under the effect of lightning waves on the transformer, one due to the lightning wave passage through capacitive couplings between the windings and the other due to the passage through electromagnetic couplings between the transformer windings, are discussed. The possibility of limiting the second maximum with the help of a nonlinear overvoltage limiter (OPN) installed on the transformer NN side (OPN-NN) is analyzed and the requirements imposed on the characteristics of such limiters under the effect of clipped waves are formulated allowing for the statistical behavior of their parameters. A mathematical model of processes in the unit is developed. It is shown that overvoltages forming in generator voltage networks of 220-500 kV units protected by OPN only on the transformer's high-voltage (VV) side exceed the levels permitted for stator unit generator insulation; acceptable operating reliability indicators under lighting surges can be ensured in stator insulation by installing overvoltage limiters both on the transformer VN and NN sides whereby the OPN-NN current protection level is on the order to 3 kA. References 3; figures 4.

Temperature Condition in Plasma Sheet Electrode's Dielectric Substrate of TEA CO_2 Laser

917K0284C Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 2, Feb 91 pp 44-48

[Article by O. A. Zhuravlev, M. P. Shlykova, N. G. Yabbarov, Kuybyshev Aviation Institute imeni S. P. Korolev]

UDC 678.5-419.8:620.193

[Abstract] A mathematical model of temperature conditions in the plasma sheet electrode's substrate is developed in order to describe the process of heating and subsequent thermal breakdown of the dielectric at all stages of electrode operation in TEA lasers. Negative plasma sheet electrode features, e.g., intense evaporation of the auxiliary discharge's dielectric substrate in contact with plasma leading to its breakdown and, consequently, a decrease in the discharge chamber service life, are examined. The problem of dielectric heating and subsequent destruction is assumed to be planar and the temperature distribution - to depend only on the coordinates in the cross-sectional plane perpendicular to the sliding discharge (SR) channel axis. The two-dimensional technique for analyzing the temperature conditions in plasma sheet electrode's dielectric substrate makes it possible to predict the discharge chamber life by determining the geometric parameters of the resulting cavities and estimate the level of gas dynamic perturbations in the near-electrode area related to the loss of dielectric material due to evaporation. It is noted that the mathematical model must be developed further to take into account the heat accumulation in the dielectric. References 10; figures 3.

On Status and Development Outlook of Power Industry Development and Social Safety Net for Industry Workers Under Market Economy Conditions

917K0247A Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 2, Feb 91 pp 2-13

[Article by Yu. K. Semenov, USSR Power Industry and Electrification Ministry]

[Abstract] The minister's report to the power industry workers congress is reprinted verbatim. The minister expresses his views on the future of the power industry in the light of the on-going democratization of the society and the transition to a market economy in the USSR. He

specifically addressed the issue of benefits and the social safety net for industry workers; in outlining his and his colleagues' priorities, he stressed the need to restore the power industry's lost credibility, address the problem of increasing remuneration and maintaining it at the level of other leading industries; preserving the integrity of the Consolidated Power System and its centralized control in the framework of the "Law on Property"; ensuring that future direction of the USSR Power Ministry is governed by the new economic mechanism based on regulated rates, total economic self-sufficiency, and principles of self-financing; allocating the rights and obligations among various regions, republics, and the ministry itself; and accelerating the development and implementation of a realistic energy program consistent with financial, physical, and technical resources, fuel availability, and approval of new power (including nuclear) plant building permits. The minister also stressed the need for a new USSR power industry law establishing the legal framework of industry operation and development.

Technical Problems of Building Underground Power Plant Units

917K0247B Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 2, Feb 91 pp 24-26

[Article by V. A. Rumyantsev, Orgenergostroy]

UDC 624.69.035.4

[Abstract] The environmental impact of power plants and measures aimed at coordinating the need for power plant construction with environmental concerns of the population are addressed. Technical and economic indicators of nuclear power plants with surface and underground water-moderated water-cooled power reactors (VVER-1000), thermal power plants, hydroelectric power plants, and pumped-storage power plants are compared. The experience of placing various types of power plant units underground and the main factors which affect the cost and length of construction are considered. The efficacy of building underground power plants and attendant technical problems are analyzed using the example of conditions at todays's of underground hydraulic works. The experience of building underground tunnels and holding chambers and various concreting and supporting methods are summarized. The need to develop computer-aided methods to facilitate the construction, control, and management processes is emphasized. Tables 1.

Environmentally Clean Boiler Plant

917K0247C Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 2, Feb 91 pp 26-28

[Article by S. M. Shestakov, O. V. Nikitina, R. P. Kochetkova, V. L. Anasov, Leningrad Polytechnic Institute]

UDC 621.181:621.182:621.311:662.93

[Abstract] The interrelation between the requirements of reliability, economic efficiency, and ecological safety of power plants and the emergence of environmental safety as the leading priority of the power industry are addressed. Ways of lowering the negative impact of harmful discharges forming as a result of power plant operation on the environment are considered. Two prevailing trends in accomplishing this goal - improving the functioning of existing equipment and developing, studying, and commercially assimilating new boiler plants with various types of furnaces which meet today's requirements - are outlined. To this end, fluidized bed furnaces, a low-temperature swirl furnace developed at the Leningrad Polytechnic Institute (LPI), and an annular furnace designed at the Sibtekhenergo are described. The authors also propose a new concept of developing an ecologically clean solid-fuel boiler plant. The design developed at LPI and Irkutsk TETs-10 and known as the LPI-ITETs-10 and its six stages are described in detail. It is stressed that the use of the proposed boiler plant with a low-temperature swirl furnace equipped with a multistage ash scrubbing system, a nitrogen recovery system, and a sulfuric acid reactor makes it possible considerably to decrease the content of toxic substances in exhaust gases: nitrous oxides to 0.15, sulfur oxides to 0.07, and ash to 0.06 g/m^2. These indicators meet the environmental requirements which will be imposed on boiler plants up until 2005. Figures 1.

Expanding Direct Current Transmission Applications

917K0247D Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 2, Feb 91 p 76

[Article by D. L. Faybisovich, Power Grid Design Institute]

UDC 621.315.17

[Abstract] Aspects of direct current transmission line (PPT) operations are summarized and their principal purposes are outlined. New applications of PPT's in high-voltage distribution networks, especially in the cases where it is necessary to increase the transmission line capacity, are addressed. Three designs aimed at increasing the current-carrying capacity and their expected impact are described on the basis of data from ABB Power Systems (Sweden); all three are based on converting existing alternating current transmission lines: adding one more wire (a 150 percent throughput increase); adding a new cross-arm and leaving the existing wire (a 200 percent increase); and replacing all supports (a 300 percent throughput increase). References 2: 1 Russian, 1 Western; figures 1.

On Use of Dry Mortar Mixtures in Construction by Foreign Companies

917K0247E Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 2, Feb 91 pp 76-77

[Article by S. V. Movchan, Orgenergostroy]

UDC 621.31.022.2:691

[Abstract] An analysis of construction of large industrial complexes in the USSR by foreign companies under "turn-key" projects performed by the Power Industry Construction Management and Atomic Power Design Institutes

together with the Belorussian Scientific Design Association Belstroynauka is summarized using the examples of the industrial complex of the Belorussian Metallurgical Works (BMZ) in Zhlobin and a tannery complex in Gatovo, Minsk oblast. Their volume of construction and erection operations is comparable to that of large thermal and nuclear power plant construction. The management and engineering principles employed by foreign companies for attaining high indicators in turnkey construction projects are examined; special attention is focused on the use of dry mortar mixtures by foreign companies. The principal dry mortar components and their ratio are listed and raw materials are described. The dry mortar mixture storage methods, labor outlays for preparation, and worker productivity are summarized. It is shown that the method of delivering the dry mixture to the site and storing it there in silos is the most efficient. A new dry mixture pneumatic transport system developed abroad is described. It is noted that dry mortar mixture may also find applications in the domestic building practice since production of all such mixture components is well developed in the country, so it would be easy to retool the necessary mixture preparation equipment. Tables 1.

Tests of Asynchronized Electromechanical Frequency Converter on Electrodynamic Model

917K0246A Moscow ELEKTRICHESTVO in Russian No 2, Feb 91 pp 47-51

[Article by I. Yu. Miroshnikov, V. V. Sarkisyan, R. S. Tsgoyev]

UDC 621.314.261.001.57

[Abstract] An asynchronized electromechanical frequency converter (AS EMPCh) - a two-unit plant one of whose units is asynchronized - and its uses as a secure power supply source for essential customers are analyzed. One of the units connected to AC mains works as a motor and the other, connected to the load - as a generator. Self-excitation and separate excitation methods are considered. To this end, AS EMPCh's are examined in a power system model in order to compare various excitation systems from the viewpoint of comparing the load voltage quality and the system's dynamic stability with different types of excitation on the load side, e.g., partial or complete load shedding or surging and connection of induction motors to load busses, determining the possibility of using various types of filters to improve the voltage curve quality, and confirming the AS EMPCh performance during brief power failures in the mains. The electrodynamic model design is described, AS EMPCh control laws are established, and test results are summarized. It is shown that during brief power interruptions, the AS EMPCh is capable of ensuring the load power supply for 0.5 s without a voltage quality degradation whereby the shaft slip reaches 5 Hz. The separate asynchronized generator excitation method is preferable to self-excitation and is characterized by a better voltage quality and higher dynamic stability during load surges, power interruptions, and induction motor startups from load busses. References 3; figures 4.

Motion of Charged Fibers in Nonuniform Electric Field

917K0246B Moscow ELEKTRICHESTVO in Russian No 2, Feb 91 pp 54-57

[Article by P. G. Shlyakhtenko, G. P. Meshcheryakova, Leningrad]

UDC 537.217.621.319.7.001.6

[Abstract] The fiber motion effect first discovered while applying coats by the electric flocculation method is addressed. The motion of fibers in a nonuniform electric field of special configuration is considered allowing for the disturbing effect of other forces affecting the fiber, viz., the drag and pondermotive mirror mapping forces which act on the fiber from the conducting electrode's side and create a nonuniform electric field. The results of calculations are compared to experimental data obtained in a unit under similar conditions at different drag levels. Calculations were performed on a BESM-6 computer. The nonuniform filed is created by two plane metallic plates. It is shown that Reynolds numbers of moving cylindrical fibers exceed those at which the air flow colliding with the fibers and can be regarded as laminar. In the case of turbulent motion, the head resistance depends on the air medium density, i.e., pressure. It is also shown that calculation results are consistent with experimental data within the margin of error, confirming the validity of the theoretical model for describing the charged fiber motion in the nonuniform electric field. References 11; figures 3; tables 4.

Electromagnetic Pulse Field Propagation in Conducting Medium

917K0246C Moscow ELEKTRICHESTVO in Russian No 2, Feb 91 pp 65-67

[Article by A. N. Gorskiy]

UDC 621.314.6.018.756

[Abstract] Mathematical difficulties inherent in solving the problems of electromagnetic pulse wave propagation in conducting media are analyzed and their applications, such as loss calculation of magnetic circuits and windings are considered on the basis of this analyses by extending known solutions for harmonic field propagation to these problems. The task is accomplished in two stages: examining the electromagnetic field propagation in a conducting medium under an external exponential excitation using the generality of mathematical properties of sine and exponential functions; and obtaining a solution under a randomly shaped external excitation by comparing the amplitude-frequency spectra of the exponential and sine functions. The calculation of losses in a laminated steel core under exponential and square pulse excitation is used as an example. It is shown that similar calculations can be performed for analyzing the electromagnetic field propagation in isolated randomly shaped single-wire conductors, multiple-wire conductors, windings with multiple-wire conductors and single-wire round and square conductors, etc. References 5.

Polyimide-Containing Composite Materials for Electrical Equipment Insulation

917K0253A Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 91 pp 2-3

[Article by L. P. Tkacheva, V. V. Rozhkov, S. B. Shagalov, T. A. Tiganina]

[Abstract] New polyimide composites for application to insulation systems capable of withstanding operating temperatures of 160-200 degrees are reported. These include a multilayered fiberglass composite coated on both sides by a polyimide film (Imidoflex-3) as well as a composite containing a secondary external protective polyimide film (Imidoflex-5). The L-PMK-T and L-PMK-TT brand polyimide composite ribbon insulation fabricated from polyimide film and fiberglass employing an organosilicon binder are also discussed. Parameters and test results are reported for Imidoflex-4, which consists of alternating polyimide film and fiberglass layers, as well as Imidoflex-5. The polyimide-containing composite materials that employ new heat- resistant binders examined here are found to enhance engineering characteristics and performance of electrical equipment.

New Silicone Finish Enamel

917K0253B Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 91 pp 3-5

[Article by T. P. Ukhartseva, V. V. Rozhkov, S. B. Shagalov, N. D. Shteyn]

[Abstract] The development of a new silicone finish enamel (K0-983) is reported. This enamel is a suspension of an inorganic pigment in a silicone electrical-insulation laquer with additives to act as hardening catalysts and to achieve the desired enamel coating qualities. The new K0-983 enamel has superior physiomechanical properties compared to the K0-911 enamel currently used, and can be applied to electrical machinery operating at temperatures up to 180 degrees centigrade. The comparative characteristics of several enamels (K0-983, K0-911, K0-935, K0-936 and K0-976) are reported, including oil resistance; thermoelasticity; volumetric resistivity and electrical strength at various temperatures and durations.

Mica-Containing Insulation for Magnet Wire

917K0253C Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 91 pp 7-9

[Article by N. S. Oknin, V. A. Khval'kovskiy, N. V. Popova, L. Z. Asnovich]

[Abstract] A new pre-impregnated mica-containing insulation (LSG brand) for application to the manufacture of high-voltage electric motor windings is discussed. This brand of ribbon insulation was initially developed for insulating the stator windings of large electric motors; specifically, for the elastic insulation on the frontal coil sections. The LSG contains 35 percent polyacrylate binder that hardens quickly at a relatively low temperature. The development of another type of pre-impregnated mica-containing ribbon insulation with a high degree of elasticity, a special mica barrier and a high-fluidity binder is also reported. Results from strength tests of the insulation are provided together with comparative figures on breakdown voltages.

Ohmic Contacts for Power Semiconductor Devices Based on New Adhesive Composites

917K0253D Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 91 pp 57-58

[Article by S. A. Shaboyan, R. P. Meliksetyan, A. S. Shaboyan]

[Abstract] A new polymer adhesive composite for application to ohmic contacts in power semiconductor devices is discussed. The new composite contains 70-77 mass percent ED-20 epoxy resin; four to 18 mass percent modifier; 18.4-11.0 mass percent maleic anhydride and 0.1-2.0 mass percent dibutyl phthalate. Tests on the new composite used as an adhesive between a tungsten plate and ST-3 steel are reported. Strength characteristics (failure/shear) are given for different temperatures. Results from experiments to determine the effect of copper and tungsten powder additives to the composites are provided. It is found that a 20-25 percent copper powder additive is optimum for yielding good ohmic and thermal contacts and a 50-60 percent tungsten powder additive is ideal for achieving good mechanical strength of the semiconductor/tungsten element junction.

Automated Product Engineering Level Assessment System

917K0253E Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 91 pp 58-62

[Article by V. M. Fomin, G. B. Onishchenko, V. L. Ablamskiy, A. Ye. Nosenkov]

[Abstract] An automated product engineering level assessment system that employs an objective analysis of the specifications of products and accounts for the international standardization requirements on such products is discussed. The principal element of this system is a data bank containing technical specifications and cost data on domestic and foreign products that is used to compare the engineering level of different products of the same type. Tables listing sample specifications and weighted attributes and factors used in the assessments are given. The system consists of a data retrieval subsystem; a statistical processing subsystem and an engineering level analysis subsystem. The system is compatible with IBM-PC/XT/AT personal computers, runs with dBASE-III PLUS and utilizes the Clipper request language.

Certain Strain and Deformation Mechanisms of Cables Fabricated From Inorganic Materials

917K0253F Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 91 pp 62-68

[Article by Yu. V. Rybakov]

UDC 621.315.2.002.2.

[Abstract] The characteristic strain, deformation, elongation, and compression mechanisms produced by rolling cables fabricated from inorganic materials are compared. Cable types tested include thermocouple cables; communications cables and special purpose cables with single and multiple conductors and jacketings. A new cold periodic rolling technique tested on these cables is found to have comparatively low feed rates and a high degree of compression per run (up to 90 percent). This technique employs roller grooves of variable profile that yield a continuous and monotonic strain along the most common cable transition points. A new mathematical expression is proposed for calculating cable elongation that yields results in good agreement with experiment.

Acoustic-Optical Devices

917K0271 Leningrad AKUSTOOPTICHESKIYE USTROYSTVA (SBORNIK NAUCHNYKH TRUDOV) in Russian, USSR Academy of Sciences 1989 pp 2, 202-205

[Annotation and Table of Contents from book "Acoustic-Optical Devices" by the Ioffe Physicotechnical Institute USSR Academy of Sciences 1989, 205 pages]

[Text]

ANNOTATION In May-June 1988, the first All-Union Conference on Optical Information Processing took place in Leningrad. The rules of the conference included plenary reports and section reports on the following topics:

1. Optical computation and optical computers; 2. Optical and opto-electronic methods and devices for image and signal processing; 3. Acoustic-optical methods and devices for signal processing; 4. Holographic and optical memory; 5. Spatial and temporal light modulators; 6. Recording media.

It was recommended that several of the summary reports on work at the conference be published. These materials are united in three collections of scientific works: Optical Computers, Optical Processors for Image and Signal Processing, and Acoustic-Optical Devices.

The materials contained in this collection reflect the current state of equipment and methods of optical information processing and will aid in the development of these fields in our country.

TABLE OF CONTENTS

1. Ye. G. Ananyev, V. E. Pozhar, V. I. Pustovoy. Effective acoustic-optic method for the measurement and recovery of spectra 3

2. A. S. Bukhenskiy, A. V. Vorobyev, S. V. Morozov. Properties of spectral analyzers with temporal integration 7

3. A. I. Yeliseyev. Use of acoustic-optical spectral analyzers with temporal integration for processing the signals of a linear antenna grid 13

4. V. I. Yefanov, Ye. S. Kovalenko, G. G. Kushch, A. V. Reshetko. Acoustic-optical spectral analyzer with superhigh resolution 18

5. Ye. S. Kovalenko, S. I. Romanov. Effect of thermo-optical distortions in light and sound guides on the parameters of an Acoustic-optical spectral analyzer with an anomalous diffraction 24

6. L. N. Asnis, A. V. Glukhov, S. V. Kuznetsov, A. V. Luchin, A. V. Moskalenko, A. N. Rogov. Fast acoustic-optical spectral analyzer 30

7. V. Yu. Petrunkin, N. A. Bukharin, S. A. Rogov, S. V. Rozov, V. G. Samsonov. Study of the spectra of rapidly changing signals in acoustic-optical devices with CCD photoreceptors 33

8. V. V. Proklov, S. V. Sokolovskiy. Acoustic-optical spectral analyzer for optical signals 39

9. Yu. A. Zyuryukin, I. M. Lipovskiy, Ye. L. Nikishin, V. P. Ryabukho. Acoustic-optical spectral analyzer with a semiconductor laser 44

10. N. N. Yevtikhiyev, N. A. Yesepkina, S. Yu. Bondartsev, A. P. Lavrov, V. V. Perepelitsa, V. I. Kolomeytsev. Practical implementation of interference optical spectral analyzers with temporal integration 48

11. K. V. Zaychenko, K. N. Timofeyev, S. P. Khrapov. Measurement of the frequency of narrowband signals on a background of noise and interference using an optical-digital Fourier processor 56

12. Ye. T. Aksenov, I. B. Grushev, A. V. Kukharev, V. Yu. Petrunkin. Integrated acoustic-optical processors as receivers for radio signal analysis systems 62

13. O. D. Moskalets. Analysis of spectra with an acoustic-optical device 67

14. Yu. V. Yegorov, Yu. S. Dmitriyev, V. M. Dernov, S. V. Grachev, A. Yu. Odintsov, A. I. Kurglov, B. V. Fedorov. Automated acoustic-optical spectrometer-phase meter with digital processing of a two-dimensional light distribution 73

15. Yu. Odintsov, B. V. Fedorov. System to process the spatial signal of an acoustic-optical spectrometer-phase meter 78

16. V. S. Kulakov, L. N. Preslenev. Use of acoustic-optical interaction to determine the phase characteristics of radio signals 83

17. A. N. Rogov, V. N. Ushakov. Dynamic range of an acoustic-optical video-frequency correlator 89

18. O. G. Gabarayev, V. A. Zubov, A. F. Tavasiyev, T. T. Sultanov, N. K. Chalikidi. Acoustic-optical radio signal corelator based on a Mach-Tsander interferometer 95

19. A. N. Simakov, A. F. Tavasiyev, V. A. Kalukhov, A. N. Torgashin. Study of heat fields with acoustic-optical devices 100

20. A. Yu. Grinev, Ye. N. Voronin, V. S. Temchenko, A. A. Rymov, V. G. Chumak, A. V. Buynichenkov. Acoustic-optical processor for linear antenna grids with compression of a long baseline linearly frequency-modulated signal 106

21. P. I. Korsunov, V. G. Serdyukov. Study of methods of two-coordinate signal processing 113

22. A. V. Pugovkin, S. A. Zaytsev. Dynamics of the passage of radio signals in a acoustic-optical spectral analyzer 119

23. V. Yu. Rakovskiy, A. S. Shcherbakov. Acoustic-optical elements of digital optical computers.....125

24. N. A. Yesepkina, O. N. Vlasov, S. K. Kruglov, A. S. Morozov, S. V. Pruss-Zhukovskiy. Broadband acoustic-optical spectrometer.....131

25. N. A. Yesepkina, M. I. Mansyrev, S. A. Molodyakov, I. I. Sayenko. Opto-electronic diagram drawing system for the Siberian solar radio telescope.....138

26. A. V. Kuzichkin, V. G. Lopatin, P. G. Tereshchenko. Convolving search for complex signals using processors with nonideal characteristics.....144

27. V. A. Volkov, Ye. N. Yepikhin, M. Yu. Kvasha, N. L. Antonova, N. V. Masalskiy. Analysis of the dynamic range of the optical track of planar acoustic-optical devices.....150

28. V. I. Nikishin, T. D. Shermergor, V. A. Volkov, Ye. N. Yepikhin, M. Yu. Kvasha, S. M. Fedotov. Integrated optical processor based on planar light diffraction in crossing fields of acoustical waves.....156

29. A. V. Vakulenko, D. K. Gramotnev, L. A. Chernozatonskiy. Supergrids in acoustic-optical information processing.....161

30. S. V. Akimov, V. M. Gorbenko, S. Yu. Yermakov, V. V. Yerokhin, A. Yu. Kudzin, L. Ya. Sadovskaya, O. V. Shakin. Acoustic-optical materials based on paratellurite.....166

31. V. V. Savchenko, S. V. Akimov, A. Yu. Kudzin. Spatial dispersion in acoustic-optics.....172

32. A. N. Sigayev, A. A. Stashkevich. Waveguide interaction of light with a three-dimensional spin wave in a ferromagnetic film.....178

33. I. G. Voytenko, N. V. Gorelyy, G. V. Kulak. Acoustic-optical signal processing in a spatially-periodic electric field.....184

34. V. B. Voloshinov, M. A. Voronova, O. V. Mironov, V. N. Parygin. Effect of optical properties of a medium and the geometry of a sonic beam on the parameters of acoustic-optical filters.....190

35. G. F. Sirotin. Convolution and correction of radio signals in acoustic-optical devices based on surfactants.....191

Table of Contents.....202

NTIS
ATTN: PROCESS 103
5285 PORT ROYAL RD
SPRINGFIELD, VA 22161

2

This is a U.S. Government publication. Its contents in no way represent the policies, views, or attitudes of the U.S. Government. Users of this publication may cite FBIS or JPRS provided they do so in a manner clearly identifying them as the secondary source.

Foreign Broadcast Information Service (FBIS) and Joint Publications Research Service (JPRS) publications contain political, military, economic, environmental, and sociological news, commentary, and other information, as well as scientific and technical data and reports. All information has been obtained from foreign radio and television broadcasts, news agency transmissions, newspapers, books, and periodicals. Items generally are processed from the first or best available sources. It should not be inferred that they have been disseminated only in the medium, in the language, or to the area indicated. Items from foreign language sources are translated; those from English-language sources are transcribed. Except for excluding certain diacritics, FBIS renders personal and place-names in accordance with the romanization systems approved for U.S. Government publications by the U.S. Board of Geographic Names.

Headlines, editorial reports, and material enclosed in brackets [ ] are supplied by FBIS/JPRS. Processing indicators such as [Text] or [Excerpts] in the first line of each item indicate how the information was processed from the original. Unfamiliar names rendered phonetically are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear from the original source but have been supplied as appropriate to the context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by the source. Passages in boldface or italics are as published.

SUBSCRIPTION/PROCUREMENT INFORMATION

The FBIS DAILY REPORT contains current news and information and is published Monday through Friday in eight volumes: China, East Europe, Soviet Union, East Asia, Near East & South Asia, Sub-Saharan Africa, Latin America, and West Europe. Supplements to the DAILY REPORTs may also be available periodically and will be distributed to regular DAILY REPORT subscribers. JPRS publications, which include approximately 50 regional, worldwide, and topical reports, generally contain less time-sensitive information and are published periodically.

Current DAILY REPORTs and JPRS publications are listed in *Government Reports Announcements* issued semimonthly by the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161 and the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The public may subscribe to either hardcover or microfiche versions of the DAILY REPORTs and JPRS publications through NTIS at the above address or by calling (703) 487-4630. Subscription rates will be provided by NTIS upon request. Subscriptions are available outside the United States from NTIS or appointed foreign dealers. New subscribers should expect a 30-day delay in receipt of the first issue.

U.S. Government offices may obtain subscriptions to the DAILY REPORTs or JPRS publications (hardcover or microfiche) at no charge through their sponsoring organizations. For additional information or assistance, call FBIS, (202) 338-6735,or write to P.O. Box 2604, Washington, D.C. 20013. Department of Defense consumers are required to submit requests through appropriate command validation channels to DIA, RTS-2C, Washington, D.C. 20301. (Telephone: (202) 373-3771, Autovon: 243-3771.)

Back issues or single copies of the DAILY REPORTs and JPRS publications are not available. Both the DAILY REPORTs and the JPRS publications are on file for public reference at the Library of Congress and at many Federal Depository Libraries. Reference copies may also be seen at many public and university libraries throughout the United States.